FP4
FP4W
version 1.3

FP4, FP4W

Flow totalizer with data recording

OPERATING MANUAL

Version: 190723EN

This operating manual is also available on the CD-ROM.

metronic

Before installation, carefully read all the instructions, especially those concerned with Environment, Health and Safety (EHS).

The device has been manufactured according to the requirements of relevant EU directives.

These instructions must be stored in a safe place near the installation of the device at all times.

Information from the Manufacturer

All functions of the recorder are subject of modifications for the benefit of technical progress.

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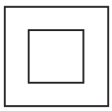
Sections marked with the symbol are available only in the CD-ROM version of this manual attached to the device.

1 SAFETY INFORMATION AND INSTRUCTIONS

Safe operation of this product can only be guaranteed if it is properly installed, commissioned, used and maintained by qualified personnel in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

Symbols



Equipment is protected throughout by double insulation or reinforced insulation.

Functional earth (ground) terminal, to enable the product to function correctly. Not used to provide electrical safety.

Caution, risk of electric shock.

Caution, risk of danger, refer to accompanying documentation.

Caution, Electrostatic Discharge for sensitive circuit. Do not touch or handle without proper electrostatic discharge precautions.

! Important comments and information.

Warning

This product is designed and manufactured to withstand the forces encountered during normal use. Use of the product contrary to its intended purpose or incorrect installation of it, any type of modifications or repairs incompatible with the following instructions could:

- cause damage to the product/property,
- cause injury or fatality to personnel,
- void the warranty of product,
- invalidate the CE marking.

! **Always isolate the mains supply before opening the product as hazardous voltages may be exposed.**

Warning

This product complies with the requirements of the following directives and harmonized standards:

EMC Directive 2014/30/EU to the following standards and specifications:

- For EMC immunity for industrial environments according to EN 61326-1:2013 Table 2.
- For EMC conductive and radiated emissions according to EN 61326-1:2013 Class A equipment.

The product may be exposed to interference above the limits of EN 61326 if:

- The product or its wiring is located near a radio transmitter.
- Excessive electrical noise occurs on the mains supply. Power line protectors (AC) should be installed if mains supply noise is likely to happen. Protectors can combine filtering, suppression, surge and spike arresters.
- Cellular telephones and mobile radios may cause interference if used within approximately 1 metre (39") of the product or its wiring. The actual separation distance necessary will vary according to the surroundings of the installation and the power of the transmitter.

Warning

This device is an Class A type instrument. In a residential environment, it may cause radio interference. In such cases, one can request to the users for appropriate measures to avoid it.

Intended use

- Check that the product is suitable for use with the application.
- Determine the correct installation and physical situation.
- Prior to installation of Metronic AKP products, take into account any environmental limitations of devices, specified in the manual.

Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product.

Lighting

Ensure that there is adequate lighting, particularly where detailed or complicated work is required.

Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks or pits), dangerous or harmful gases, extremes of temperature, hot surfaces, fire hazards (e.g. during welding), excessive noise, moving machinery.

The system

Consider the effect on the complete system of the work proposed. Will any proposed action put any other part of the specific system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms.

Tools and consumables

Before starting work ensure that you have suitably required tools and/or consumables available at the work place.

Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

Permits to work

All the work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions. Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where it is necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if it is necessarily required.

Cleaning and maintenance

Metronic AKP products require no maintenance beyond periodic battery replacement. Expected battery life is 10 years after the expiry of which must be returned to the manufacturer for a replacement.

From time to time you should clean the casing with a dry, soft cloth. When cleaning, do not use solvents or abrasives. They may cause discoloration or scratch the surfaces of device.

Disposal

The FP4/FP4W contains a battery. On disposal of the unit or component, appropriate precautions should be taken in accordance with Local/National regulations.

Unless otherwise stated in the Installation and Maintenance Instructions, with the exception of the battery, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

Returning products

Customers are reminded that under EHS regulations, when returning products to Metronic AKP they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present Environment, Health and Safety (EHS) risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

2 DELIVERY CONTENT, ACCESSORIES AND STORAGE

Prior to dispatch, each Metronic AKP device is inspected and calibrated to ensure proper and efficient operation.

CAUTION
Upon receipt, each package should be inspected for any potential damage.

The content of the whole package should also be checked and the actual number of elements should be compared against the manufacturer's list of items presented in the consecutive subsection. In the case of damage or lack of elements, a report should be drawn up in the presence of the carrier specifying the date of receipt and signature of the person delivering the package.

2.1 Delivery content – FP4

- The FP4 flow totalizer 1 pc.
- A set of plug-in type screw connection 1 set
- Fixing clamp 2 pc.
- Seal (assembled between case and panel) 1 pc.
- A CD with the user instructions and configuration software 1 pc.
- Quick start guide - printed 1 pc.
- Warranty Card 1 pc.
- Certificate of Calibration 1 pc.

2.2 Delivery content – FP4W

- The FP4W flow totalizer 1 pc.
- A CD with the user instructions and configuration software 1 pc.
- Quick start guide - printed 1 pc.
- Warranty Card 1 pc.
- Certificate of Calibration 1 pc.

2.3 Storage

If the device is to be stored if not used for a period of time and prior to the assembly, the required storage conditions should be observed. The device should be kept in ambient temperature range from -30 °C to 70 °C at the relative humidity at 5% to 95% (non-condensing).

Prior the installation and connecting the device to the power supply make sure that there is no condensate water inside the device.

2.4 Accessories (optional)

- CONV485E
- CONV485USB-I
- CONV485USB
- Power supply unit
- USB flash drive

3 GENERAL PRODUCT OVERVIEW

3.1 Purpose

FP4/FP4W is a versatile, modern and precise flow totalizer with internal data logging. The device is used in industry and in the supervision of production lines. Equipped with two analogue inputs (RTD, 0-20mA or 4-20mA, ±10V) and two PULS type inputs (frequency measurement, pulse counting, binary signal tracking and recording) can measure flow and other values, such as temperature and humidity. In addition FP4/FP4W has two math channels and two totalizers assigned to each of the six available channels. Device can communicate with master system through Ethernet port (Modbus TCP protocol, web server) or through RS-485 port (Modbus RTU protocol) and can work in distributed control systems.

The FP4 device is supplied from 24 VDC source, while the FP4W device is supplied from 230 VAC source. Detailed information concerning the power supply is given in consecutive parts of the document, in section power supply connection.

3.2 Basic functions

- **Measurement of the process values**

  The device is equipped with 4 measurement inputs: two analogue type (0/4-20mA, R/RTD, U) and two PULS type. Each inputs is assigned to appropriate channel.

- **Math channels**

  Within the math channels, selected mathematical operations are available: addition, subtraction, division and multiplication (based on the measured values, according to the formulas entered by the user). There are two available math channels.

- **Flow measurement**

  Each measurement input (including binary inputs) and each calculated value have two independent totalizers assigned. Totalizers for pulse inputs can provide precise pulses count. In addition, the operating time of each totalizer is recorded. Message containing totalizers and timers values can be sent automatically in the form of an e-mail (up to 5 recipients) at the indicated hour every day, on a selected day of the week or on a selected day of the month. Values of totalizers and timers can be reset externally using PULS type inputs, for example with using a push-button connected to the input.

- **Alarms and control**

  Two alarm thresholds may be set for every channel. Binary outputs can be assigned to alarm thresholds. Two modes are available for alarms: latched (‘Alarm’ mode) and non-latched (‘Control’ mode). 4 relay outputs are available. The message about exceeding the alarm threshold and return to the normal value can be sent automatically in the form of an e-mail (up to 5 recipients).

- **Analogue output**

  One 4-20 mA output is available, enabling retransmission of the selected channel value (also math channel value).

- **Results recording**

  Process values, math channels, totalizers and timers (operating time of totalizers) can be recorded into internal flash memory with the capacity of 2 GB. Data are saved as text files and protected with encoded checksum. Apart from the measured values, the device also saves events (power loss, resetting, exceeded threshold values, etc.) and authorised operations.

- **Displaying the results**

  Measured and calculated results can be displayed on the 4” colour LCD screen. The values of channels, totalizers and timers are presented in digital form (max. 11 character displayed for process values and max. 14 digits displayed for totalizers; after exceeding the measuring range for process value or totalizer value, the ----- symbol will be displayed on the screen and will be saved in the archive). Measurement screens can be browsed sequentially or set to a selected channel.

- **Communication with a supervisory computer or a control system**

  The device enable data transmission to a supervisory computer or a control system by means of:
  - a built-in RS-485 serial port; available Modbus RTU protocol,
  - Ethernet port; available Modbus TCP protocol.

- **Software for PC**

  FP4/FP4W - dedicated software (*FP4 Config.exe*) enables device configuration using the computer. The software is intuitive and has an interface which is very similar to the interface of the device. The software can be installed on the computers with the MS Win operating system.

  The REPORT software (*FP4-RP.exe*) for archived data enables visualization and analysis, using the computer. The *FP4-RPplus.exe* program enables online transfer of archived data.

3.3 Available options

Device is available in panel mount version (FP4) and in wall mount version (FP4W). Both device versions have the same features.

The configuration of the settings described in the Operating Manual is the same for both versions of the device.

3.4 Galvanic separation in the device

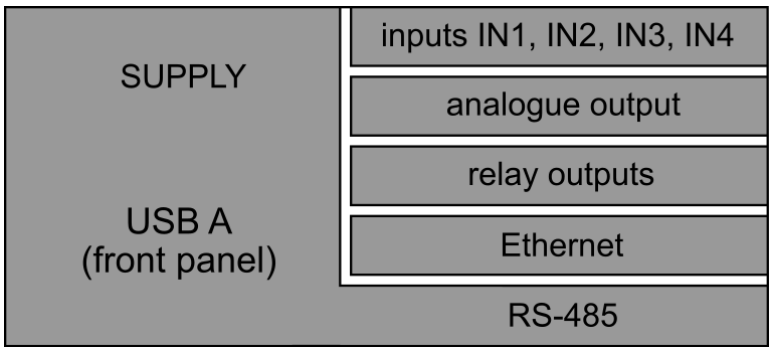


Fig. 3.1 Galvanic separation in FP4 device (functional separation 500VAC @ 1min).

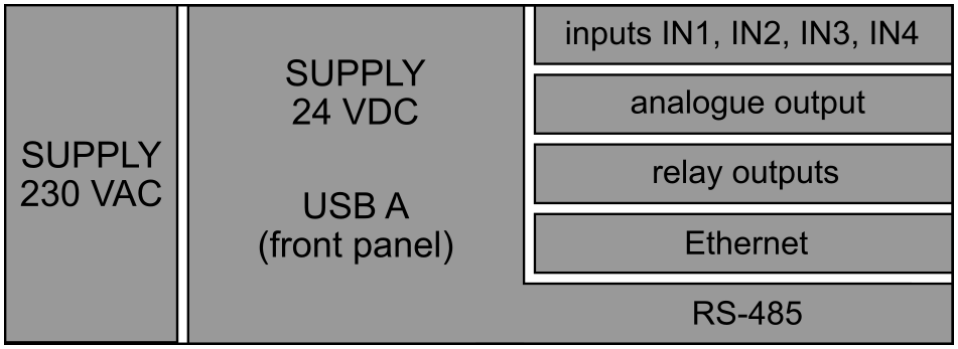


Fig. 3.2 Galvanic separation in FP4W device (functional separation 500VAC @ 1min).

4 MECHANICAL INSTALLATION

! Prior to the commencement of any assembly work, read carefully the information concerning safety described in section SAFETY INFORMATION.

4.1 Mechanical installation of the FP4 device

FP4 is a panel-mounted device. It can be mounted into panels at least 1 mm thick. Before installation, a $138^{(+1)}$ mm X $68^{(+0.7)}$ mm rectangular opening must be cut out in the panel. The mounting depth of the device (with connected terminals) is 127 mm. In order to ensure easy installation of electrical connections, it is recommended to leave an extra space of approx. 30 mm behind the device.

When installing the device in the panel opening, the seal between the housing frame and the panel have to be fitted. After inserting the device into panel opening, the fixing clamps should be latched on both side walls. Next, tighten the screws. With the removable screw terminal block, it is possible to install electrical connections first and then mechanical installation of the device.

	FP4
Mounting cut-out in panel – width	$138^{(+1)}$ mm
Mounting cut-out in panel – height	$68^{(+0.7)}$ mm
Depth of mounting with connectors	127 mm

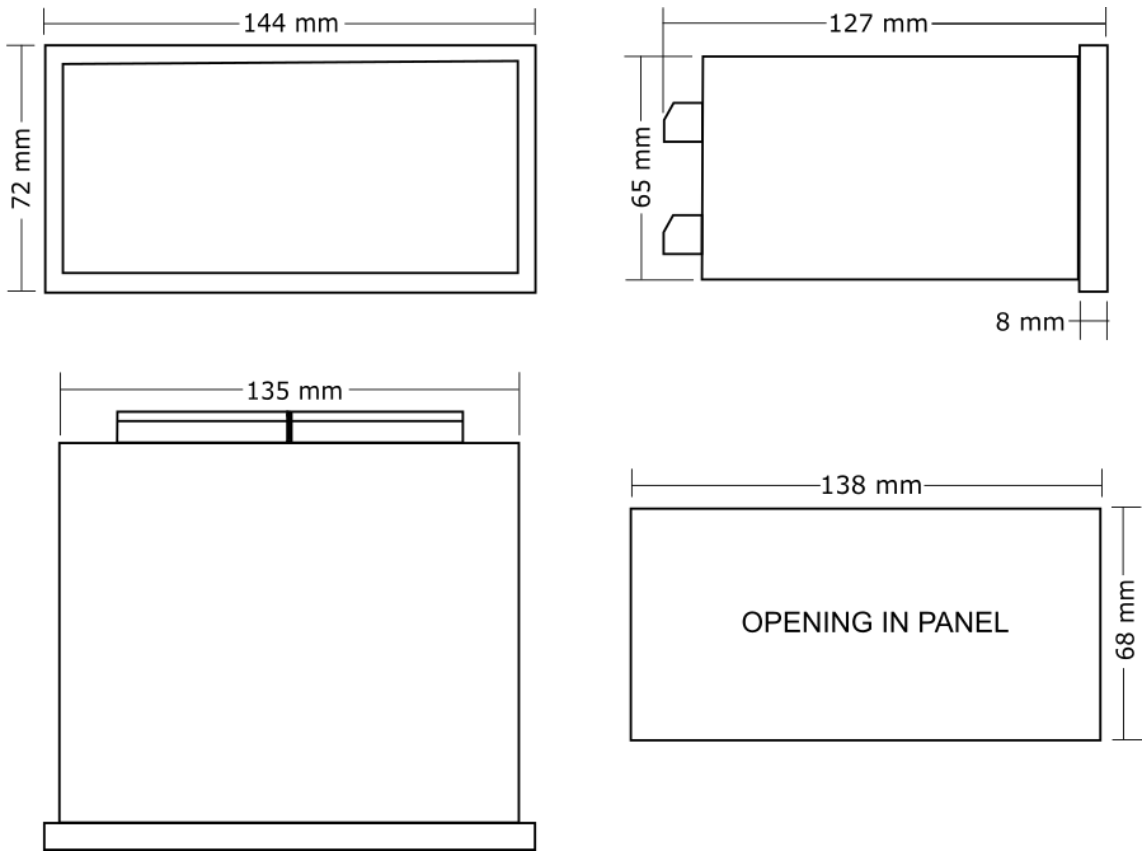


Fig. 4.1 Housing dimensions of FP4 device and cut-out dimensions of an assembly panel.

! **The device cannot be exposed to direct heat generated by other equipment.**

When assembled, the operating device cannot be affected by interference from other components (contacts, power relays, inverters).

4.2 Mechanical installation of the FP4W device

FP4W is a wall-mounted device. Device dimensions without cable glands: 213 mm x 185 mm x 102 mm (width x height x depth).

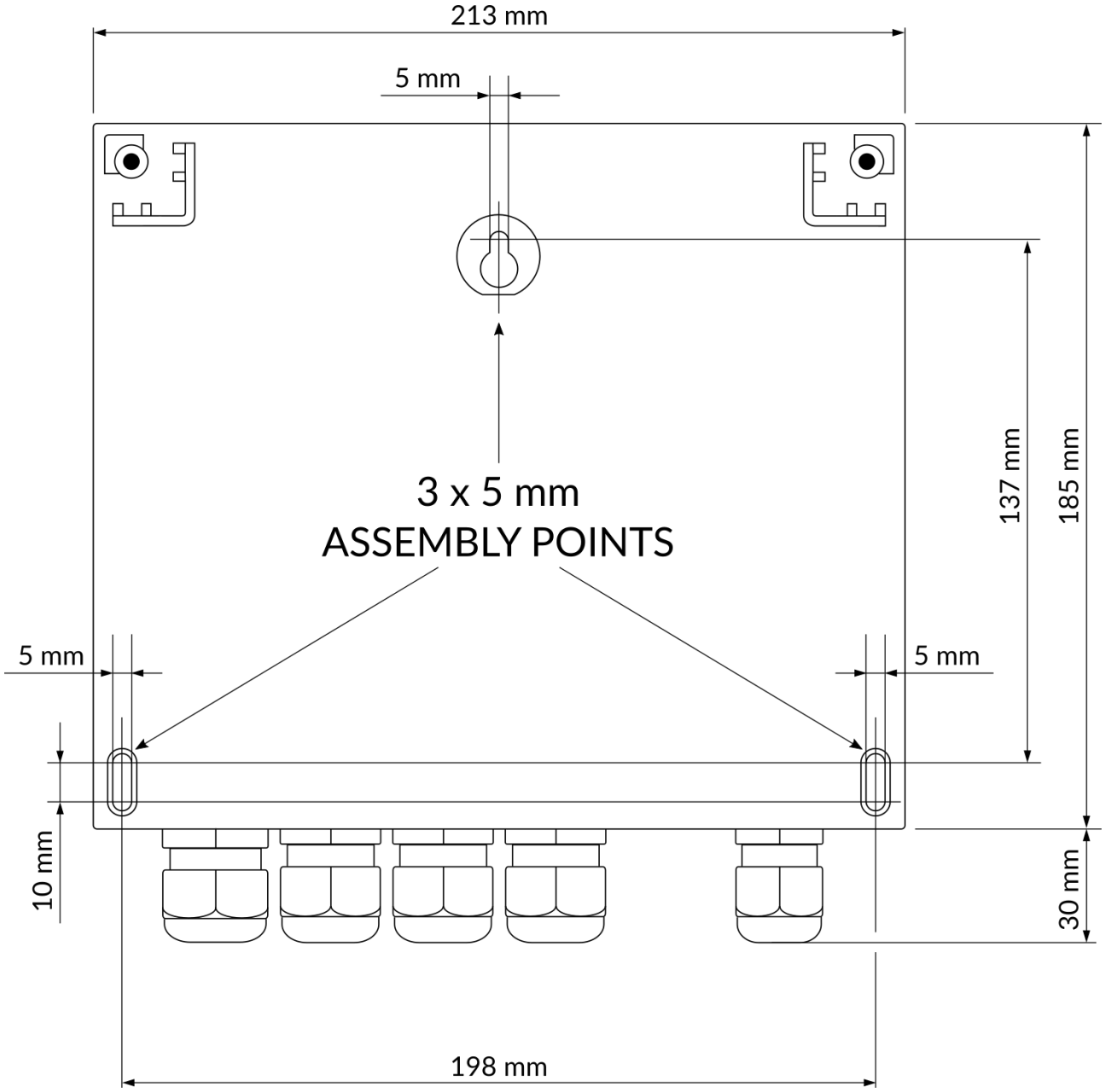


Fig. 4.2 Assembly diagram of FP4W device.

5 ELECTRICAL INSTALLATION

! Prior the commencement of any connection works, read carefully the information concerning safety described in section SAFETY INFORMATION.

Power supply and all signal wires are connected to plug-in screw terminals, situated at the rear panel of the device (FP4) or spring terminals at the bottom of the device (FP4W). Maximum wires cross-section area is 1.5 mm^2. Both wire and cord cables can be used. Wires should be stripped 8 mm to 10 mm at the end. If cables with a larger cross-section are used, it is recommended to use an intermediate terminal block in the measurement cabinet between the facility wiring and the device.

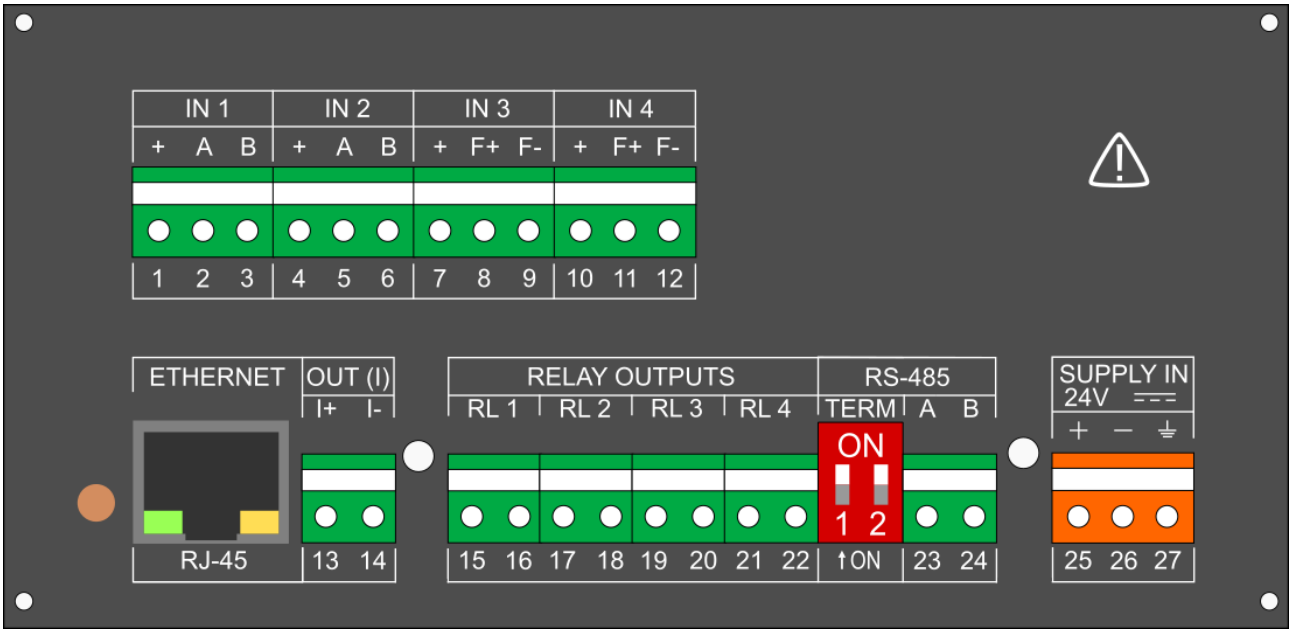


Fig. 5.1 Rear panel view of the FP4 device.

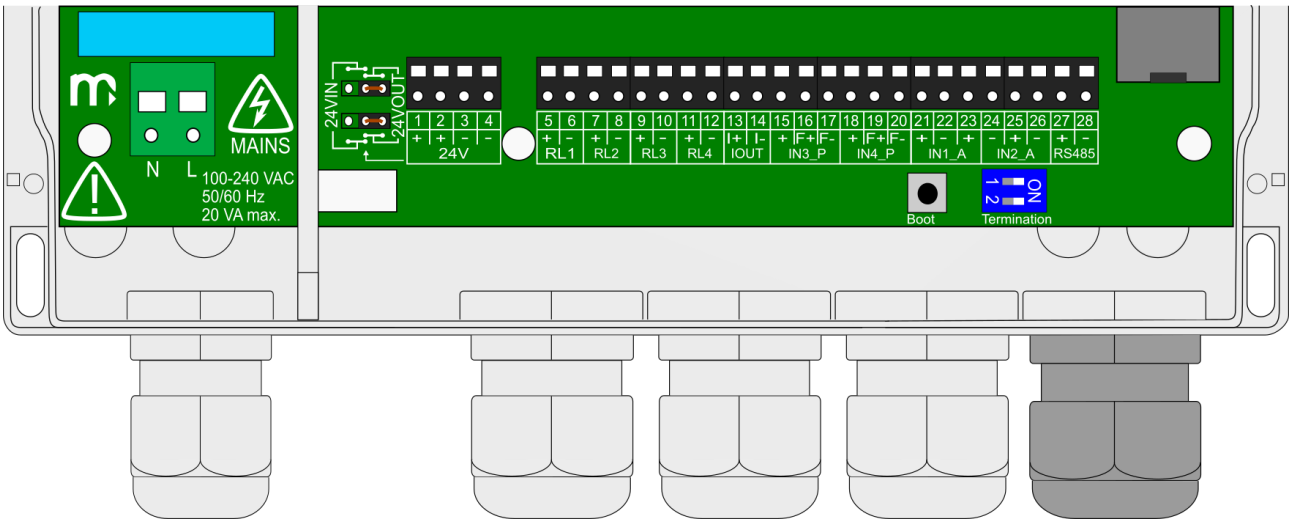


Fig. 5.2 Terminals in the FP4W device.

5.1 Configuration of jumpers inside the device

In order to configure the analogue input to a specific operating mode, the jumper connections inside the device must be changed. A change may be required in case of:

- connection of a transducer of a given type to analogue inputs,
- connection of a transducer of a given type to PULS type inputs,
- connecting/disconnecting filters on PULS type inputs.

Changing the jumper configuration is required when supplying the FP4W device from 24 VDC source. More information in section Power supply connection (FP4W).

The jumper configuration should be changed before connecting the sensors and programming the settings. It is required to remove the rear plate of the device's housing (FP4) or the front part of the housing (FP4W).

! Disassembly of the housing should be made solely by a trained personnel. The rear panel of the FP4 device should not be draw out more than necessary to connect jumpers.

In the upper part of the FP4 housing there is a label showing the correct way of configuration of the jumpers inside the device and electrical connections. In the lower right corner of the label there is a place in which current configuration of the device can be marked.

Information about the correct configuration of jumpers for a given type of input is also displayed in the I/O configuration window.

! In the I/O configuration window there is only hint about the correct configuration of the jumpers inside the device (it is not the information about their current configuration).

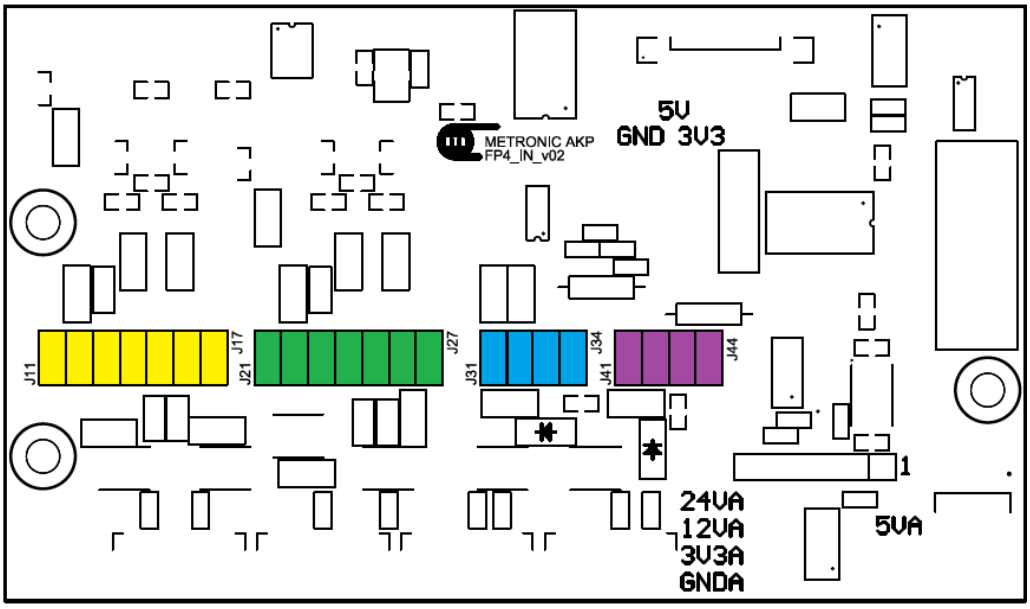


Fig. 5.3 Layout of jumpers inside the FP4 device.

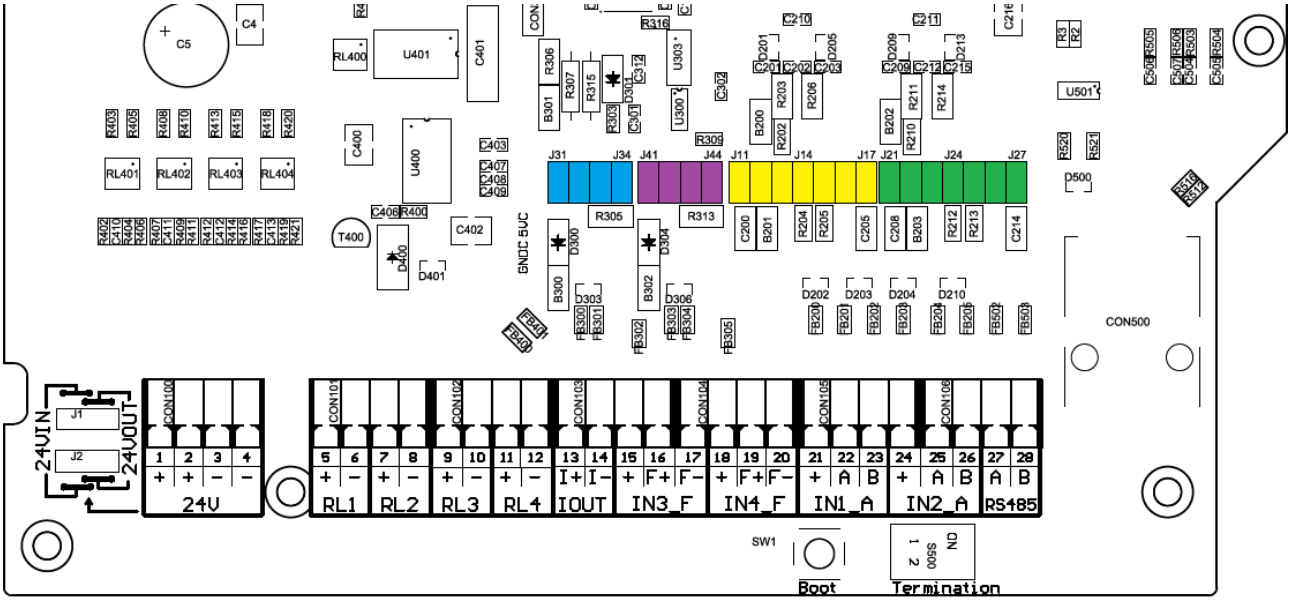


Fig. 5.4 Layout of jumpers inside the FP4W device.

5.1.1 Configuration of jumpers related to analogue inputs (IN1, IN2)

	INPUT 1 (IN1)							INPUT 2 (IN2)						
Input type:	J11	J12	J13	J14	J15	J16	J17	J21	J22	J23	J24	J25	J26	J27
0/4-20mA		X			X	X			X			X	X	
R/RTD	X	X					X	X	X					X
U (±10V)			X	X						X	X			

Notes:

The ‘X’ sign means closed jumper. The device is delivered in the 0/4-20mA configuration. Each input can be independently configured to a different operating mode.

5.1.2 Configuration of jumpers related to PULS type inputs (IN3, IN4)

	INPUT 3 (IN3)				INPUT 4 (IN4)			
Input to connect:	J31	J32	J33	J34	J41	J42	J43	J44
OC or passive contact type transmitter			X				X	
EH type current transmitter	X				X			
NAMUR type current transmitter		X				X		
active voltage transmitter								

Notes:

The ‘X’ sign means closed jumper. The device is delivered is the OC/contact configuration (the additional filtering capacitor disconnected). To connect the additional filtering capacitor, configure jumpers according to the table below. Each input can be independently configured to a different operating mode.

	INPUT 3 (IN3)				INPUT 4 (IN4)			
	J31	J32	J33	J34	J41	J42	J43	J44
FILTER ON				X				X

5.2 Wiring transducers to analogue inputs

The device has two analogue inputs, which can work in one of the selected modes: 0/4-20mA (active/passive transducers), R/RTD type input, U type input. It should be taken into account that the configuration of jumpers inside the device is necessary. Detailed description is in section Configuration of jumpers inside the device.

0/4-20mA input type (passive transducers)

Fig. 5.5 Wiring passive transducers to 0/4-20mA input type.

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
1 (+)	**4** (+)	**+24V OUT (22 mA max) / I+** Transducer power supply. Each output is protected by resetable polymer 50 mA fuse. Current loop signal input (+)	**21** (+)	**24** (+)
2 (A)	**5** (A)	**I-** Current loop signal input (-)	**22** (A)	**25** (A)
3 (B)	**6** (B)	**Not used**	**23** (B)	**26** (B)

0/4-20mA input type (active transducers)

Fig. 5.6 Wiring active transducers to 0/4-20mA input type.

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
1 (+)	**4** (+)	**Not used**	**21** (+)	**24** (+)
2 (A)	**5** (A)	**I+** Current loop signal input (+)	**22** (A)	**25** (A)
3 (B)	**6** (B)	**I-** Current loop signal input (-)	**23** (B)	**26** (B)

R/RTD input (2-wire connection)

Fig.5.7 Wiring diagram for R/RTD input type (2-w.).

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
1 (+)	**4** (+)	**Not used**	**21** (+)	**24** (+)
2 (A)	**5** (A)	**U+ / I+** Sens input for 2-wire connection	**22** (A)	**25** (A)
3 (B)	**6** (B)	**U- / I-** Sens input for 2-wire connection	**23** (B)	**26** (B)

U-type input (transducers with voltage output)

Fig. 5.8 Wiring of transducers with voltage output.

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
1 (+)	**4** (+)	**Not used**	**21** (+)	**24** (+)
2 (A)	**5** (A)	**U+** Voltage signal input (+)	**22** (A)	**25** (A)
3 (B)	**6** (B)	**U-** Voltage signal input (-)	**23** (B)	**26** (B)

5.3 Wiring transducers to PULS type inputs

The device has two PULS type inputs, which can work in one of the selected modes: OC/contact, EH, NAMUR, U. It should be taken into account that configuration of jumpers inside the device is necessary. Detailed description is in section Configuration of jumpers inside the device.

OC/contact input type (OC type transmitter or passive contact)

Fig. 5.9 Wiring of OC transmitters to PULS type inputs.

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
7 (+)	**10** (+)	**Not used**	**15** (+)	**18** (+)
8 (F+)	**11** (F+)	**U+** Input (+)	**16** (F+)	**19** (F+)
9 (F-)	**12** (F-)	**U-** Input (-)	**17** (F-)	**20** (F-)

Notes:
Input in OC/contact configuration not requires external voltage source.

EH input type (active current transmitter)

Fig. 5.10 Wiring of current transmitters to PULS type inputs (EH configuration).

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
7 (+)	**10** (+)	**Not used**	**15** (+)	**18** (+)
8 (F+)	**11** (F+)	**I+** Current loop signal input (+)	**16** (F+)	**19** (F+)
9 (F-)	**12** (F-)	**I-** Current loop signal input (-)	**17** (F-)	**20** (F-)

NAMUR input type

Fig. 5.11 Wiring of NAMUR transmitters to PULS type inputs.

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
7 (+)	**10** (+)	**+12V OUT (22 mA max) /I+** Transducer power supply. Each output is protected by resetable polymer 50 mA fuse. Current loop signal input (+)	**15** (+)	**18** (+)
8 (F+)	**11** (F+)	**I-** Current loop signal input (-)	**16** (F+)	**19** (F+)
9 (F-)	**12** (F-)	**Not used**	**17** (F-)	**20** (F-)

U input type (transducers with voltage output)

Fig. 5.12 Wiring of voltage transmitters to PULS type inputs.

Terminal No. (FP4)		Description	Terminal No. (FP4W)	
7 (+)	**10** (+)	**Not used**	**15** (+)	**18** (+)
8 (F+)	**11** (F+)	**U+** Voltage signal input (+)	**16** (F+)	**19** (F+)
9 (F-)	**12** (F-)	**U-** Voltage signal input (-)	**17** (F-)	**20** (F-)

5.4 Wiring diagram for the analogue output

Fig. 5.13 Wiring diagram for the analogue output.

Notes:
Current source passive – requires external voltage source.

5.5 Wiring diagram for the relay outputs

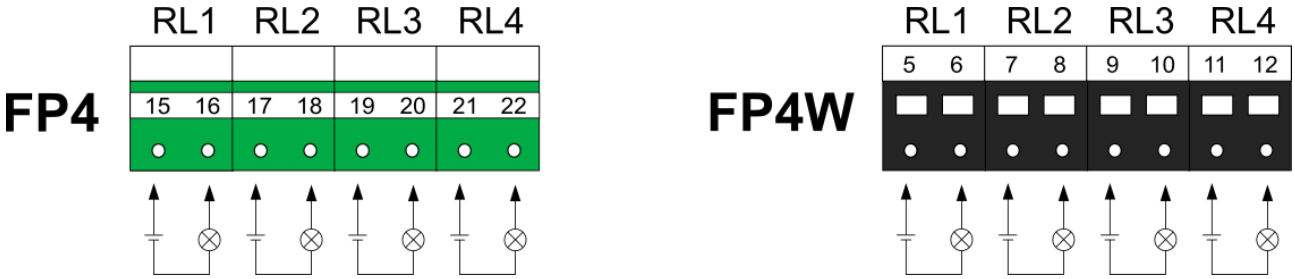


Fig. 5.14 Wiring diagram for the relay outputs.

5.6 Connection of RS-485 data transmission line

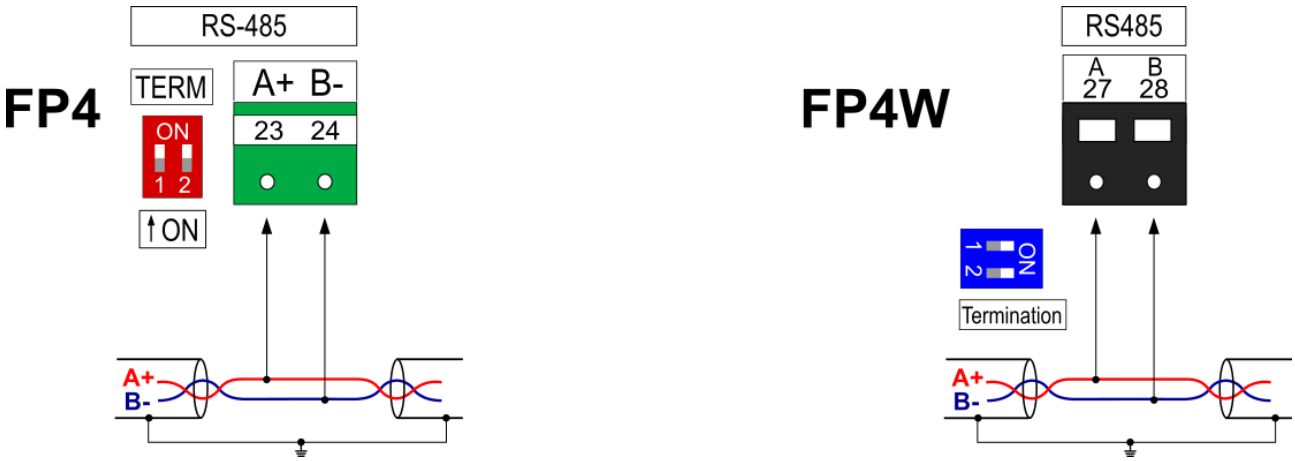


Fig. 5.15 Wiring diagram for RS-485.

Notes:
The device RS-485 receiver/driver allows connection of up to 32 devices.

An RS485-MODBUS configuration must have one trunk cable, along which devices are connected, directly (daisy chaining) or by short derivation cables.

The maximum bus length depends on the baud rate, the cable (gauge, capacitance or characteristic impedance), the number of loads on the daisy chain. For a 9600 Baud Rate

and 0.125 mm^2 (AWG26) or wider gauge, the maximum length is 1200 m. The derivations must be short, never more than 20 m.

To minimize the reflections from the end of the RS-485 cable it is required to place a line termination near each of the 2 ends of the bus. The device has an internal termination system, activated by DIP switch on the left side of the terminal block. The correct operation of the terminator requires setting both switches in the same position.

The ‘common’ wire should be used for all RS-485 ports. For FP4 device as a common signal the power supply ‘-’ (terminal no. 26) or functional ground (terminal no. 27) have to be used. For the FP4W device supplied from 230 VAC source (jumpers in the 24OUT configuration), the '-' terminal (terminal 3 or 4) should be used as a common signal.

5.7 Ethernet port

Ethernet (100Base-T) port is located in the rear panel of the FP4 device or at the bottom of the FP4W device. Outputs connections are compliant with EIA/TIA-568A/B. A LAN cable (Patch Cord) ended with RJ-45 plug may be connected to this port.

5.8 Power supply connection (FP4)

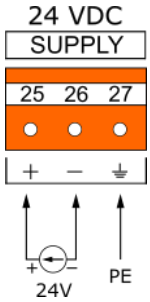


Fig. 5.16 Power wiring diagram (FP4).

The device requires 24 VDC power supply. If supplied from 230/110 VAC, it is recommended to use high efficiency industrial switching power supply at minimum 15 W of delivered power.

To ensure safety, the device's supply must satisfy the conditions applicable to lower voltage sources SELV (Safety Extra Low-Voltage), supplied with the 24 VDC as per the IEC60950-1.

In order to eliminate interference, it is recommended to connect the ground wire to the terminal block (terminal no. 27). It is so called functional ground. This connection is not required due to safety requirements.

Details are described in section TECHNICAL SPECIFICATION.

5.9 Power supply connection (FP4W)

The device is delivered in the 24OUT jumpers configuration, which enables supplying the device from 230 VAC source. In this configuration, additional devices can be supplied via terminals 1-4 (max. 100 mA).

To supply the device from 24 VDC source, change the configuration of the jumpers inside the device (the 24IN jumpers configuration). In this configuration, additional devices cannot be supplied via terminals 1-4 (max. 100 mA).

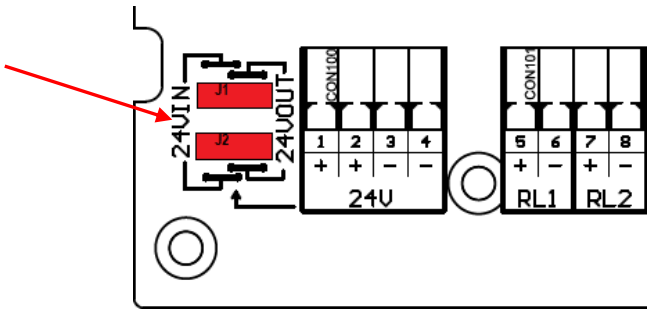


Fig. 5.17 Jumpers inside the FP4W device for changing the supply voltage.

Device supplied with 230 VAC source

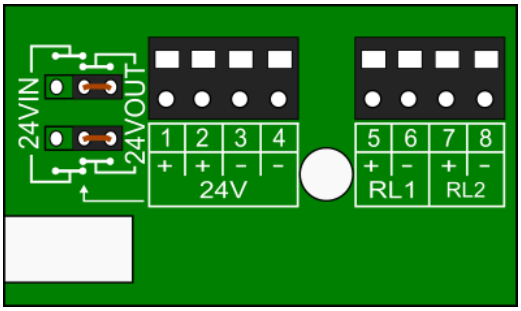


Fig. 5.18 Configuration of jumpers in the FP4W device (device supplied with 230 VAC source).

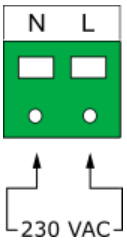


Fig. 5.19 Power wiring diagram (device supplied with 230 VAC source).

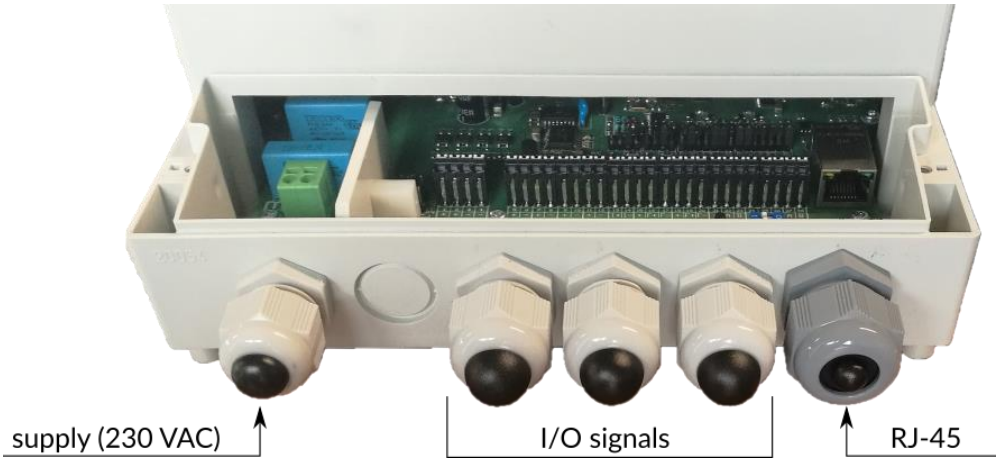


Fig. 5.20 Diagram of wiring the power supply and I/O signals to the FP4W device (device supplied with 230 VAC source).

It is recommended to use an external fuse and a power switch.

Device supplied with 24 VDC source

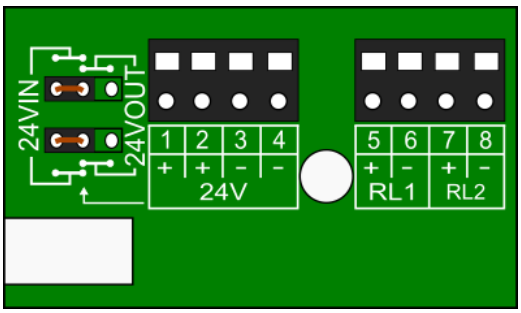


Fig. 5.21 Configuration of jumpers in the FP4W device (device supplied with 24 VDC source).

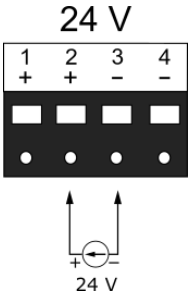


Fig. 5.22 Power wiring diagram (device supplied with 24 VDC source).

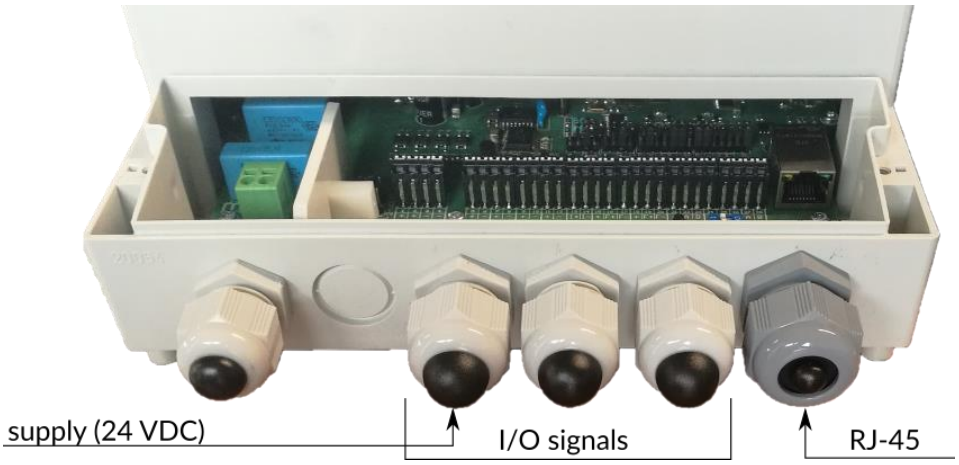


Fig. 5.23 Diagram of wiring the power supply and I/O signals to the FP4W device (device supplied with 24 VDC source).

If device is supplied from 24 VDC source, it is recommended to use high efficiency industrial switching power supply at minimum 15 W of delivered power.

To ensure safety, the device's supply must satisfy the conditions applicable to lower voltage sources SELV (Safety Extra Low-Voltage), supplied with the 24 VDC as per the IEC60950-1.

Details are described in section TECHNICAL SPECIFICATION.

6 FRONT PANEL AND MAIN FUNCTION BUTTONS

6.1 Front panel

A 4" LCD touch screen is built into the front panel of the device which is the basic tool of communication with the user.

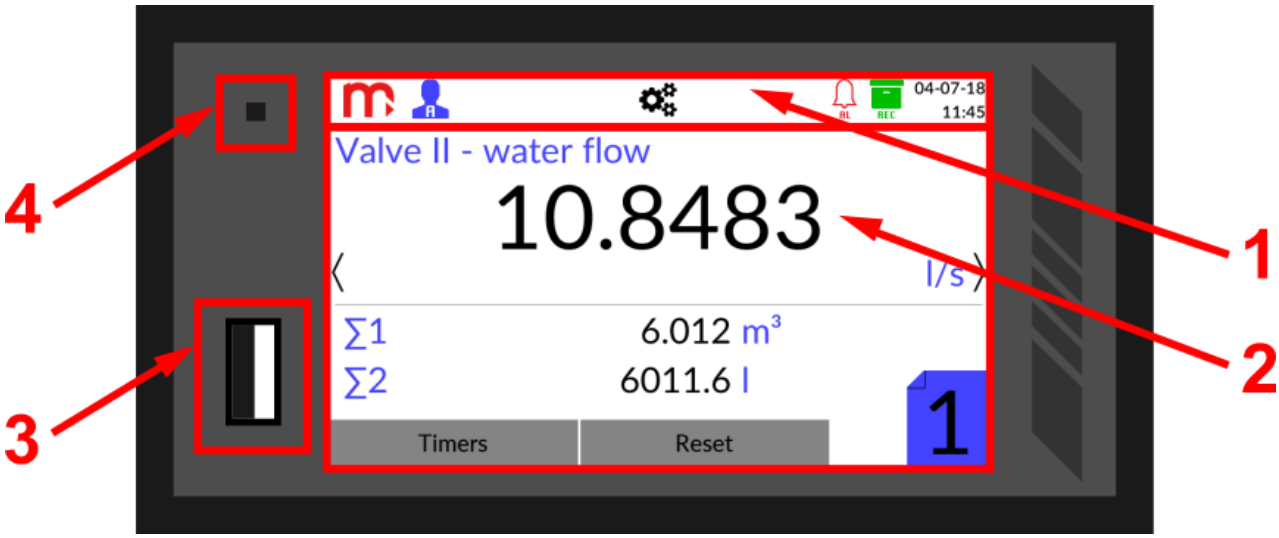


Fig. 6.1 Front panel of FP4 device.

The display is consists of:

1. Title bar — with functional icons, having an information function.
2. Main screen — used to present the results of all the measurements, display all function windows and upload data (using the screen's keyboard); touching the main screen shows up arrows (on the sides of the screen) which enable switching between windows and shows up the Main Menu icon (on the title bar) which enables switching to the settings window.

Additionally, the front panel contains:

3. USB port — enables connecting an external mass storage device (a USB flash memory) to move data stored in the internal memory from the device to a PC.
4. LED — signals processes using colors:
   - green – lights during taking a screenshot and when new archive is creating,
   - blue – lights when the device is starting; during reading/saving the file (flashing during copying data between internal memory and USB flash memory); illuminate when screen is dimmed on 0%,
   - red – informs about errors.

! **Do not use sharp or metal tools to operate the touch screen. Improper use may result in damage on the display.**

6.1.1 Title bar

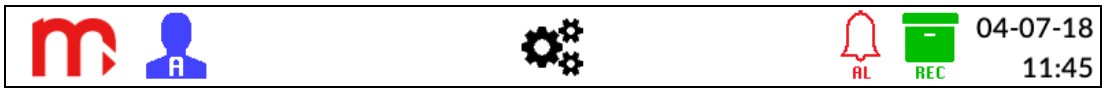


Fig. 6.2 Title bar.

The title bar is located in the top part of the screen and has mainly the informative function, but there are also function icons.

Manufacturer logo: function icon, tap to make screenshot to internal memory of the device (more information in section Print screen).

Information about the login status (more information in section Login).

Main Menu icon: function icon, clicking toggles to the Main Menu window (more information in section Main Menu).

Alarm status, flashing/illuminating icon indicates an alarm (more information in section Alarms).

Archive status: displayed icon informs that the archiving process is enabled (more information in section Archive).

04-07-18
11:45 Date and time read from the RTC clock.

6.1.2 Switching between windows

Switching between windows is possible using arrows: 〈 and 〉. To show up arrows, touch the screen.

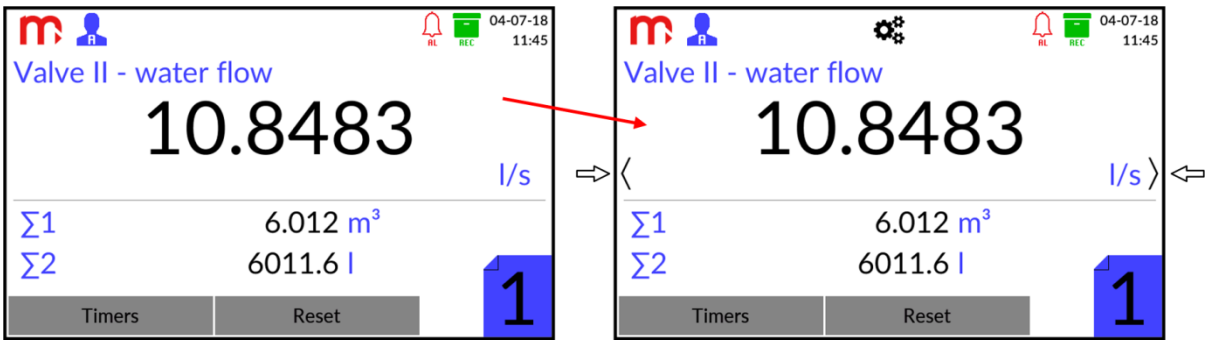


Fig. 6.3 Touching the screen shows up arrows which enable switching between windows.

Additionally, touching the screen results in showing the icon which enable switching to the Main Menu window (return after pressing the **Exit** icon).

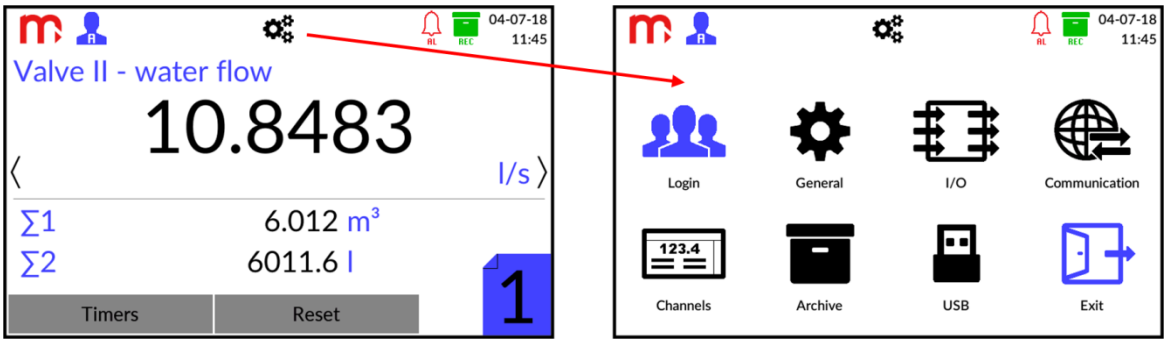


Fig. 6.4 Touching the screen shows up an icon which enables switching to the Main Menu window.

7 FIRST START UP AND KEY ACTIVITIES

Having plugged the device to power supply it will automatically switch on after the elapse of several seconds. The device has set English language. Before configuring the device, first login to appropriate level of access.

7.1 Access control, login and change of user password

7.1.1 Access control

In the FP4 device, access control module was applied aimed at limiting the possibility of changing the parameters of work of the device and copying the data from the device by unauthorized users or operators.

It is realised through 5 access control levels:

- **No logged in user**
  Standard operating mode enabling screen viewing. This level does not allow any modification of the parameters and prohibits access to the device using the USB stick. The operator may not open any configuration windows, except for the login window. This level can be turned off (more information in the section Changing the password).

- **User**
  The first level of the authorised user. It enables viewing of the device settings, archive control (start, stop, new archive file), resetting the values - minimum and maximum, zeroing the totalizers and copying the files through the USB port. In addition, user may take screenshots.

- **Administrator**
  The second level of the authorised user. It enables the same functions which has User level. In addition, this level enables viewing and modifications of the device settings and deleting the archive files.

- **Service**
  This level is accessible solely for the authorised technicians of Metronic AKP.

- **Factory**
  The level is accessible solely for the manufacturer.

7.1.1 Login

To login to the relevant access level press the button on the title bar and then select the icon. It is the only active pictogram in the Menu screen available to the unlogged user. Next, from the drop down list select the suitable access level and enter the password using the screen password keyboard. Press **LOGIN** button to confirm the operation.

During the first login, default passwords have to be used:

Access level	Password
User	0
Administrator	1

After the initial login, the passwords can be changed (more in section Changing the password).

The icon (logged as Administrator) or the icon (logged as User) on the title bar informs about the login status.

Logout, regardless of the user access level, is automatic after the elapse of 5 minutes of idleness. To log out after a shorter period, in Login window (→) press the **Logout** button.

Previous log out the user to login to another access level is not required.

7.1.2 Changing the password

Password can be changed in the Login window. After logging in, with using the old password, select the level for which the passwords is changed from the drop down list. Next, enter the new password twice and confirm the operation using the **Change** button.

! The password keyboard enables using only small and block letters and special characters. It is not possible to use letters specific to a particular language. This option is available in all other keyboards of the device.

It is possible to save a lack of password for selected control level - press on the field *New password* and *Confirm new password* and do not enter any characters. Then, confirm the operation (**Change**). If there is no password saved for the User, the access level *No logged in user* is automatically removed - there is no possibility to log out from the User level.

In addition to the change of the password, the Administrator can also change the User password without the need to know the previous password. If the Administrator's password is forgotten, contact the Metronic AKP Service.

7.2 Change of the language

To change the language, in the first step user should login as the Administrator (information in section Login).

To change the language, press the button on the title bar and then select the icon. In the next step, select the **General** tab. From the drop down list **Language** select one of the seven available languages: EN (ENGLISH), DE (DEUTSCH), ES (ESPAÑOL), FR (FRANÇAIS), IT (ITALIANO), PL (POLSKI), PT (PORTUGUÊS).

Having selected the language and confirming the selection , click on the **Exit** icon. There will be a message with the request to confirm the intention to make changes.

After delivery, the device has the English language set. After selecting the **Restore factory settings** option, the device will start in English (more information in section Factory settings).

7.3 Recommended order for configuration of the device

Individual parameters of the device can be configured in any order; however, some of the settings depend on other parameters. For this reason, it is recommend the following order for the first configuration of the device:

1. **Change of the language**

   → → **General** tab → **Language** → ✓

2. **I/O settings**

   → → *configuration of I/O settings*→ ✓

3. **Channel settings**

   → → **Inputs** tab → *configuration* → **General** tab → *configuration* → ✓

4. **Totalizers**

   → → ∑**1** tab → *configuration* → ∑**2** tab → *configuration* → ✓

5. **Alarms**

   → → **Alarm 1** tab → *configuration* → **Alarm 2** tab → *configuration* → ✓

6. **Recording measurement results**

   6.1 Channels

   → → **General** tab → Archiving (☐/☑) → ✓

   6.2 Totalizers

   → → ∑**1**/∑**2** tab → Archiving (☐/☑) → ✓

   6.3 Alarms

   → → **Alarm 1**/**Alarm 2** tab → **Log event** (☐/☑)→ Change the frequency of archiving (☐/☑) → ✓

   6.4 Archive

   → → *configuration* → ✓

7. **RS-485 transmission**

   → → **RS485 COM** tab → *configuration* → ✓

8. **Ethernet transmission**

   → → **Ethernet** tab → *configuration* → ✓

9. **E-mail notification**

   → → **Alarm 1**/**Alarm 2** tab → E-mail Notification (☐/☑) → ✓

   → → ∑**1**/∑**2** tab → E-mail Notification (☐/☑) → ✓

   → → **Ethernet** tab → *configuration* → ✓

   The device must be connected to the network. Before configuring the E-mail tab, configure the Ethernet tab and reset the device.

   → → **E-mail** tab → **General** tab → *configuration* → **Recipients** tab → → *configuration* → **Cyclic report** tab → *configuration* → ✓

10. **Display (display brightness/background colour/screen saver parameters)**

    → → **Display** tab → *configuration* → ✓

11. Changing administrator password

→ → **Change password** →

After configuring and confirming the selection , click on the **Exit** icon. There will be a message with the request to confirm the intention to make changes. Starting archive process in the Archive window: press the **START** button.

Detailed information regarding programming of the individual settings is given in section PROGRAMMING SETTINGS .

Due to the use of the same interface, device configuration using the computer software *FP4 Config.exe* takes place in the same way as configuration from the device level. After completing the configuration using the computer, record the setting file *.par using a USB flash memory, as described in the next section.

7.4 Reading and saving files using the USB port

To read or write files using the USB flash memory select the button from the title bar and then the icon. On the left side of the screen, there is a window with a list of archive files and screenshots. On the right side of the screen, there are function buttons. Return to the Main Menu window after pressing the button.

Plug in the flash memory. Afterwards, a window with setting files (*.par) located on USB flash memory is displayed. Flash memory must be in FAT16 or FAT32 format (not in NTFS format). Do not connect the hard disk drive. Compatibility of all USB memory devices is not guaranteed. Do not use an extension cable when connecting a USB memory device. This may cause radio interference with other devices.

Using the function buttons it is possible to: copy data from the device to a portable USB flash memory (archives, screenshots, settings), copy files from the USB flash drive (settings files) and delete archive files from the device (except for current archives).

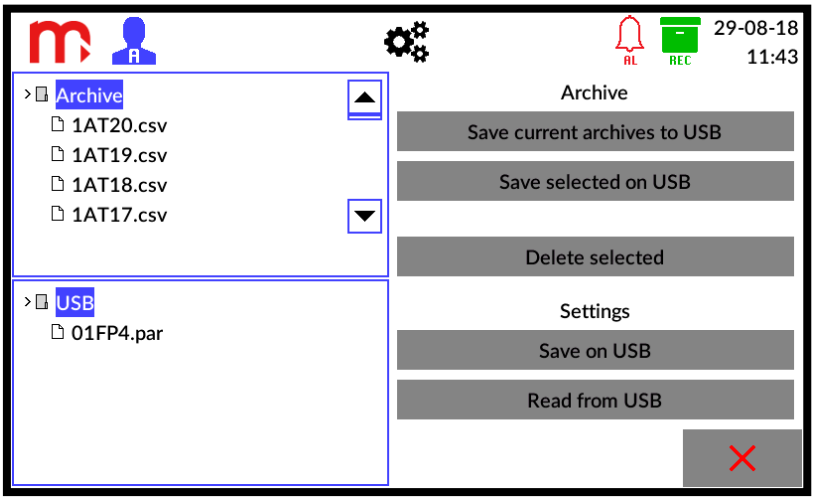


Fig. 7.1 An example view of the 'USB' window.

To record the current archive files, select the **Save current archives to USB** option. As a result three archive files, i.e. data, totalizer and event files will be stored to the pendrvie.

If another file is to be recorded on a USB drive, first select the relevant file from the list. The selected file will be marked in blue. Then, choose the option: **Save selected on USB.**

The duration of the process is signalled by the blue diode on the face plate. After correct storage of the date, a suitable message is displayed.

! Removing the USB flash memory before the writing process is complete may result in damaging of the recorded files.

To erase a selected archive file, first select the required file from the list and then select the **Delete selected** option.

There is also a possibility:

- saving settings on a USB flash memory (select the **Save on USB** button),
- reading settings from a USB flash memory (select relevant file from the list and then choose the **Read from USB** button).

If new settings file from the flash memory is read, the device will automatically reboot.

7.5 Factory settings

To restore the device to the factory settings, first login as the Administrator.

! Before selecting the factory settings option, it is recommended to save the previous settings on the USB flash memory. Otherwise, the settings will be lost.
Files in the archive will not be deleted.

! The administrator password will not be changed. The user's password will be restored to default.

In the next step, select the button from the title bar and then the icon. Select the **Service** tab and then the **Restore Factory Settings** button. The device will automatically reboot with factory settings.

After choosing the factory settings option, each device is activated in English by default (to choose a language select: → → **General** tab → **Language** →).

All previous settings will be lost, in particular I/O settings, which results in displaying only ‘Information about the device’ window.

Configure the settings of the device starting from I/O stetting, in the order described in the section Recommended order for configuration of the device.

8 TECHNICAL SPECIFICATIONS

Front panel (FP4, FP4W)	
Type of display	LCD TFT 4” 800 px X 480 px LED backlight
Display size	86.4 mm X 52.5 mm
Keyboard	resistive touch panel
Additional indication	LED RGB
USB Port - front panel (FP4, FP4W)	
Version	USB 2.0 (with limited functionality, for connection of FLASH storage)
Connector type	USB standard ‘A’ type socket
Files system	FAT16, FAT32(1)
(1)Compatibility of all USB memory devices is not guaranteed.	
Ethernet Port (FP4, FP4W)	
Interface	10/100Base-T Ethernet
Connector type	RJ-45
Transmission protocol	Server WWW, Modbus TCP ICMP (ping)
Number of connections opened simultaneously	Max 4
RS-485 Serial Port (FP4, FP4W)	
Signals output on terminal block	A(+), B(-)
Galvanic isolation	None
Maximum load	32 receivers/transmitters
Transmission protocol	Modbus RTU Slave
Transmission rate	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 115.2 kbps
Parity control	Even, Odd, None
Frame	1 start bit, 8 data bits, 1 stop bit
Maximum length of line	1200 m
Internal terminating resistor	Vcc-A(+)-B(-)-G: 390 Ω - 220 Ω - 390 Ω (activated by DIP-switches)
Maximum differntial voltage A(+), B(-)	-7 .. +12 V
Minimum output signal of transmitter	1.5 V (at R_L= 54 Ω)
Minimum sensitivity of receiver	200 mV / R_{IN}= 12 kΩ
Minimum impedance of data transmission line	54 Ω
Short-circuit/thermal protection	Yes/Yes
Internal data memory (FP4, FP4W)	
Memory type	Flash
Capacity	2 GB
Estimated recording time for recording speed every 2 s for 6 measuring channels	ca. 2 years
Supply (FP4)	
Supply voltage	24 VDC (20 .. 30 VDC)
Maximum power consumption	6 W (typically 4 W)
Security	The internal delay fuse 3.15 A, the exchange only by the service company
Supply (FP4W)	
Supply voltage	100 .. 240 VAC 50/60 Hz or 24 VDC (20 .. 30 VDC)

Maximum power consumption	• for 100 .. 240 VAC 50/60 Hz power supply: 8 W (typically 6 W) • for 24 VDC (20 .. 30 VDC) power supply: 6 W (typically 4 W)
Security	The internal delay fuse 3.15 A, the exchange only by the service company
Output 24 V OUT (FP4W)	
Output voltage (on 24 V OUT)	unregulated 18 .. 26 VDC
Maximum load current (on 24 V OUT)	100 mA
Electrical connections (FP4)	
Type	screw terminal connectors
Wire cross section	solid and flexible 0.14 .. 1.5 mm^2 flexible with bootlace ferrule 0.25 .. 1.5 mm^2 AWG 30 / 14
Electrical connections (FP4W)	
Type	spring type terminal block
Wire cross section	• supply 230 VAC: 0.2 .. 2.5 mm^2 • others: 0.2 .. 1.5 mm^2
Cable glands	• supply: one M16 cable gland, cable diameter: 5 .. 10 mm • I/O signals: three M20 cable glands, cable diameter: 8 .. 13 mm • Ethernet: one M20 cable gland, cable diameter: 6 mm (the possibility of installing a cable with an RJ-45 connector)
Mechanical Dimensions – enclosure (FP4)	
Enclosure type	panel mount, nonflammable plastic material 'Noryl'
Dimensions with connectors (w X h X d)	144 mm X 72 mm X 127 mm
Dimensions of panel cut-out (w X h)	138^{+1} mm X $68^{+0.7}$ mm
Maximum panel thickness	5 mm
Weight	0.5 kg
Protection class	IP30 on front panel side IP30 on rear panel side
Mechanical Dimensions – enclosure (FP4W)	
Enclosure type	Wall mount, polycarbonate material
Dimensions (w X h X d)	• without cable glands: 213 mm x 185 mm x 102 mm • with cable glands: 213 mm x 215 mm x 102 mm
Weight	c.a. 0.8 kg
Protection class	IP54
Environmental conditions (FP4, FP4W)	
Ambient temperature	• FP4: 0 .. +50 °C • FP4W: -20 .. +50 °C
Relative humidity	5 .. 95% (without steam condensation)
Maximum altitude	<2000 m above sea level
Storage temperature	-30 .. +70 °C
Degree of pollution	PD2
EMC	EMC Directive 2014/30/EU EN 61326-1:2013 Table 2 (immunity) EN 61326-1:2013 Class A (emission)
RoHS	RoHS Directive 2011/65/EU

Installation location	• FP4: Indoor only • FP4W: Indoor or outdoor[2]
[2]If additional protection against atmospheric precipitation is provided (roofing), the device can be installed outdoor.	

ANALOGUE INPUTS (FP4, FP4W)	
Number of inputs	2 (input type (0/4-20mA/RTD/U) configurable by jumpers inside the device)
Update rate	0.5 s/display every 1 s
Low-pass digital filter (damping filter)[3]	A time constant programmed in the range 2 .. 60 s
Galvanic isolation between inputs	None
Galvanic isolation from the other circuits	Functional, 250 VAC
Maximum input voltage	±30 VDC between terminals A(I+), B(I-)
[3]Device has two low-pass filters. Notch filter designed to reject 50/60 Hz interference set automatically depending on the measurement update rate. Digital low-pass filter with time constant is programmable by the user.	
Configuration: 0/4-20mA input[4]	
Measurement range	0 .. 22 mA
Input resistance	<100 Ω
Initial accuracy (T_a=+25 °C)	±0.1% of range (typically ±0.05% of range)
Conversion characteristic	Linear or User
Transducers powered from recorder	24 VDC (+10/-20%), 24 mA (current-limited polymer fuse)
[4]The device is delivered in the 0/4-20mA configuration.	
Configuration: R/RTD input	
Sensor type	• Resistive (refer the table below) • Linear resistance
Sensor connection type	2-wire
Sensor current	420 µA
Wire resistance compensation in the 2-wire connection	User programmed in the range of -99 .. +99 Ω
Resistance of wires (to the sensor)	max 50 Ω
Transducer resistance range	0 .. 2700 Ω
Initial accuracy (T_a=+25 °C)	±0.5 Ω (typically ±0.3 Ω)
Conversion characteristic for R	Linear, User or sensors
RTD sensor type, range and accuracy	Refer the table below
Configuration: U (±10 V) input	
Voltage range	-10 .. +10 V
Input resistance	>10 kΩ
Conversion characteristic (for U)	Linear or User
Initial accuracy (T_a=+25 °C)	±0.5% of range

PULS TYPE INPUTS (FP4, FP4W)	
Number of inputs	2
Measurement range	• 0.01 Hz .. 10 kHz, additional filter disabled • 0.01 Hz .. 1 kHz, additional filter enabled
Minimum pulse width	• 50 µs, additional filter disabled • 0.5 ms, additional filter enabled
Maximum input voltage	±30 VDC (between terminals F+ and F-)
Frequency measurement	
Conversion characteristic	Linear or User

Initial accuracy (T_a=+25 °C)	0.05% * f ±0.1 Hz
Pulse counting	
Conversion characteristic	Linear
Measuring range	0 .. 10 kHz
Initial accuracy (T_a=+25 °C)	0.05% * f ±0.1 Hz (without losing pulses in the counters)
Configuration: OC/contact[5]	
Open contact voltage	ca. 4.3 V
Short circuit current	ca. 4.3 mA
Switch on/off threshold	ca. 2.4 V / 2.6 V
Maximum short circuit resistance	100 Ω
[5]The device is delivered in the OC/contact configuration, with the additional filtering capacitor disconnected.	
Configuration: current input EH	
Input resistance	200 Ω
Switch on/off threshold	ca. 11 mA / 13 mA
Configuration: current input NAMUR	
Input resistance	1.5 kΩ
Switch on/off threshold	ca. 1.6 mA / 1.8 mA
Configuration: voltage input	
Input resistance	>10 kΩ
Switch on/off threshold	ca. 2.4 V / 2.6 V
Maximum input voltage	±30 VDC

RELAY OUTPUTS (FP4, FP4W)	
Number of outputs	4
Outputs type	Solid state relays
Maximum voltage	60 V AC/DC
Maximum load current	0.1 A

ANALOGUE OUTPUT 4-20mA (FP4, FP4W)	
Output signal	4-20 mA (3.6 .. 22 mA)
Current loop supply	no (external supply required)
Maximum voltage between I+ and I-	28 VDC
Minimum supply current loop voltage	9 VDC (R_L=0 Ω)
Loop resistance (R_L)	0 .. 500 Ω
Accuracy	0.2%
Galvanic isolation to supply voltage	Functional, 250 VAC

TABLE OF RTD SENSORS		
Sensor type	**Range**	**Accuracy**
Pt100, Pt200, Pt500, Pt1000 (EN 60751+A2:1995)	-200 .. +850 °C -328 .. +1562 °F	±0.5 °C (typically ±0.3 °C) ±0.9 °F (typically ±0.5 °F)
Ni100, Ni120, Ni1000 (DIN43760 /08-1985)	-60 .. +250 °C -76 .. +482 °F	±0.5 °C (typically ±0.3 °C) ±0.9 °F (typically ±0.5 °F)
Cu50, Cu53, Cu100 (GOST6651-2009)	-180 .. +200 °C -292 .. +392 °F	±0.5 °C (typically ±0.3 °C) ±0.9 °F (typically ±0.5 °F)
KTY81 (NXP Rev05-25.04.2008)	-55 .. +150 °C -67 .. +302 °F	±0.5 °C ±0.9 °F

KTY83 (NXP Rev06-4.04.2008)	-55 .. +175 °C -67 .. +347 °F	±0.5 °C ±0.9 °F
KTY84 (NXP Rev06-8.05.2008)	-40 .. +300 °C -40 .. +572 °F	±0.8 °C ±1.5 °F
Linear resistance	0 .. 2700 Ω (or sub-range)	±0.5 Ω (typically ±0.3 Ω)

9 ENTITY LAUNCHING THE PRODUCT ON EUROPEAN UNION MARKET

Manufacturer: METRONIC AKP s.c.
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www.metronic.pl

Vendor:

Notes:

Notes:

10 USER SCREENS

Switching between windows is possible with using: arrows 〈, 〉 (displayed on the sides of the screen) and the main menu icon (displayed on the title bar). Arrows and the main menu icon shows up after touching the screen.

10.1 Information about the device

This screen contains all the basic data concerning the device: model, ID, serial number, firmware, IP address, COM (RS485) communication parameters and Modbus address.

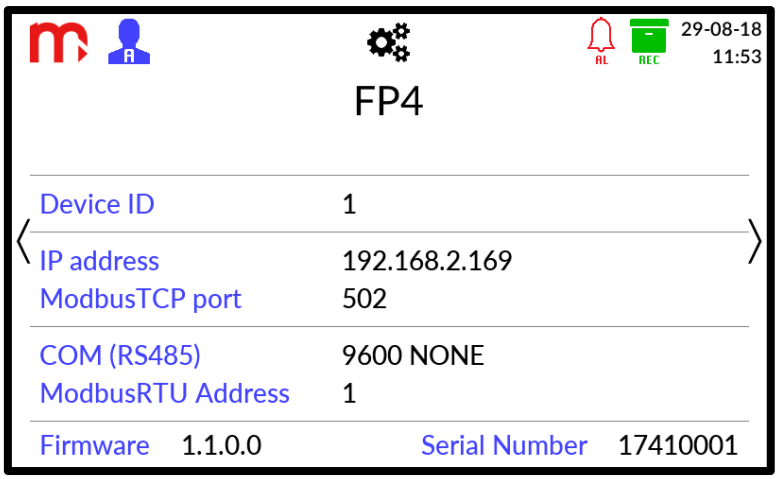


Fig. 10.1 An example view of the 'Device Information' window.

10.2 Single result window

The window is used for displaying a single result channel (only for enabled channels).

The window displays all data concerning a selected measurement channel:

- channel description,
- current value,
- a unit,
- values and units of totalizers 1 and 2 (if totalizers are active),
- values of timers (operating time of totalizers 1 and 2, if totalizers are active),
- channel number.

In the top part of the screen, there is a channel description entered by the user. Below, the current value of the channel is displayed together with the unit declared by the user. At the bottom part of the screen there are values of totalizers (Σ1, Σ2) or timers (T1, T2) with their units (switching with the buttons **Totalizers**/**Timers**).

Click on the **Reset** button to reset the value of totalizers and timers (for totalizers marked as Resettable). After pressing, the window for reset parameters shows up (only for logged in user). It is possible to zeroing values for a single channel or for all active channels.

The channel number is displayed in the bottom right corner of the screen.

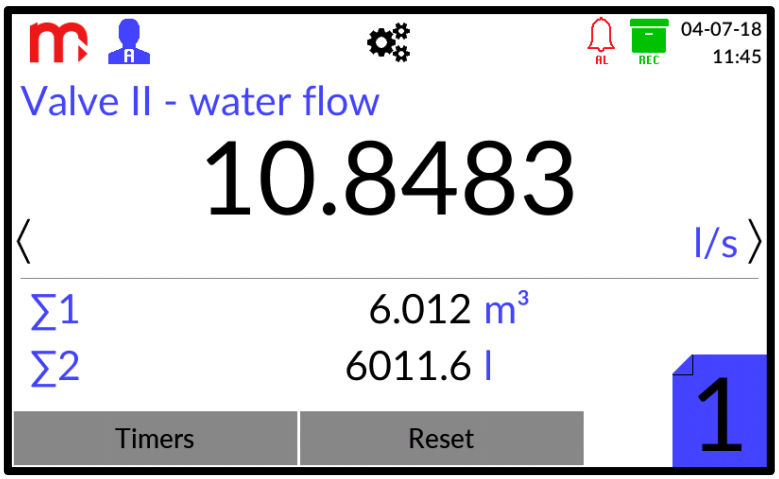


Fig. 10.2 An example view of the 'Single result' window.

Using the arrows (appearing on the sides of the screen), a change of the displayed channels is possible. Keeping the arrows down for a few seconds enables sequentially displaying other channels.

10.3 Archive

Archive window is sub-divided into two parts. Above is the field containing information about the frequency of the archiving data. There is also information about number and type of current archives. For the current data archive, two archiving frequencies have been envisaged. The active one is marked in black (inactive is marked in grey). In this field there is an information about the frequency of the archiving totalizers. Additionally, this field contains information concerning the percentage use of the internal memory of the device.

Below is the field containing information about the current archiving status of process values and totalizers for all channels (in the order from the first to the sixth channel). In the *Process Values* row, one rectangle corresponds to one channel (current value). In the *Totalizers* row, the upper rectangle corresponds to the first totalizer, the lower one corresponds to the second totalizer for one channel. The value stored in the archive is marked in green (not archived value is marked in grey).

This window also contains functional buttons for the control of the archiving process (STOP/START and New Archive), available for logged-in user. Details of these operations are described in section ARCHIVE .

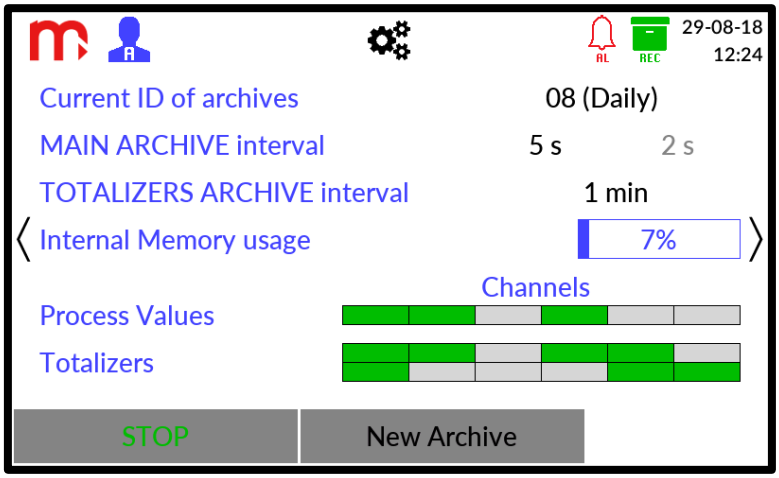


Fig. 10.3 An example view of the 'Archive' window.

10.4 Alarms

The Alarms window contains alarm statuses for all channels. This window is displayed only when at least one alarm is enabled. For each of the channels is assigned a single rectangle divided into two parts corresponding to the first and second alarm respectively.

Identification of alarms is possible using the appropriate colors:

- alarm disabled
- alarm enabled, inactive
- alarm enabled, active

If the alarm color is not declared (selected from the list during configuring alarms settings as *Disabled*), it will be marked in blue when an alarm occurs.

If the displayed color (red, green, yellow, blue) flashes, then the alarm is unacknowledged. Continuous displaying of the color means confirmed alarm.

Depending on the settings, the device may make a sound signal for new alarms.

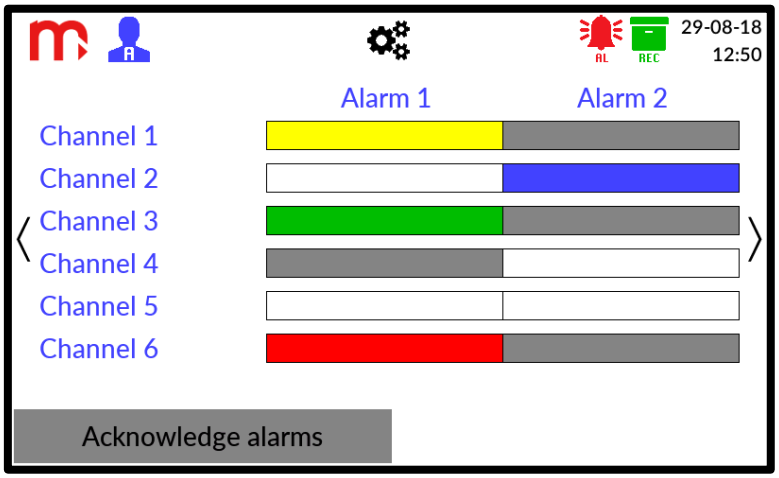


Fig. 10.4 An example view of the 'Alarms' window.

Confirmation of alarms is done by pressing the button Acknowledge alarms (required access level: User or higher).

10.5 Output window

The Output window contains the current statuses of all relay outputs and the analogue output. This window is displayed only when at least one relay outputs or analogue output is enabled.

The window is divided into two parts. In the upper part of the screen there is an information about the current value of the analogue output (the '-----' symbol means that the output is turned off).

At the bottom of the screen there is an information about the status of relay outputs (marked as RL1 - RL4). The outputs are presented graphically (the icon means open state, the icon means closed state). The output configured as disabled is in the open state (the icon).

Information about the settings of the relay outputs and the analogue output can be verified in the I/O settings window.

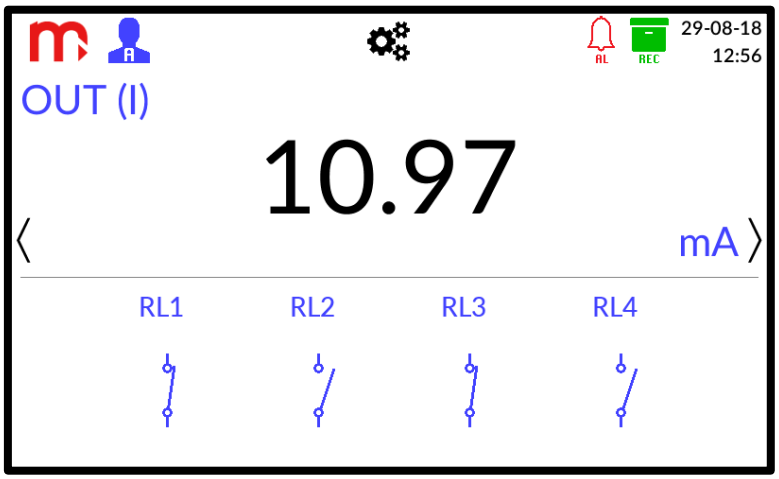


Fig. 10.5 An example view of the 'Output' window.

10.6 Main Menu

To display Main Menu window, select the icon on the title bar (return after pressing the **Exit** icon).

This screen contains a menu made up from the function icons and their descriptions. Clicking on the pictogram toggles the user to a suitable sub-screen with settings windows: Login, General, I/O, Communication, Channels, Archive, USB. More information in section PROGRAMMING SETTINGS .

Switching to individual settings windows is possible only for the logged-in user. The settings can be saved from the Administrator level only.

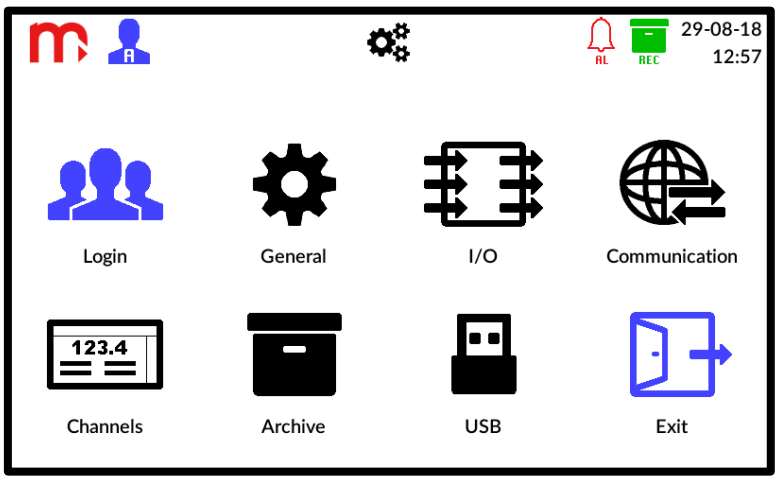


Fig. 10.6 An example view of the 'Main Menu' window.

11 PROGRAMMING SETTINGS

To accept any changes to the device setting, first confirm them using the button in the right bottom part of the screen, and then click on the Exit icon. It will be displayed a message requesting user to confirm the changes. After confirmation, in some cases, the device will switch off and reboot with the new settings.

Clicking the button will close a particular window and cancel any changes that were done.

Changing the settings starts in the Main Menu window (the icon on the title bar). Clicking on the icon toggles the user to a suitable sub-screen with settings windows:

- Login,
- General settings,
- Input and output settings,
- Communication settings,
- Channels settings,
- Archive settings,
- USB.

11.1 General settings

Switching between settings windows is possible by using tabs: *General*, *Display*, *Date & Time*, *Service*. Confirm and cancel buttons are common for all sub-windows, clicking on these buttons results in toggles to the Main Menu.

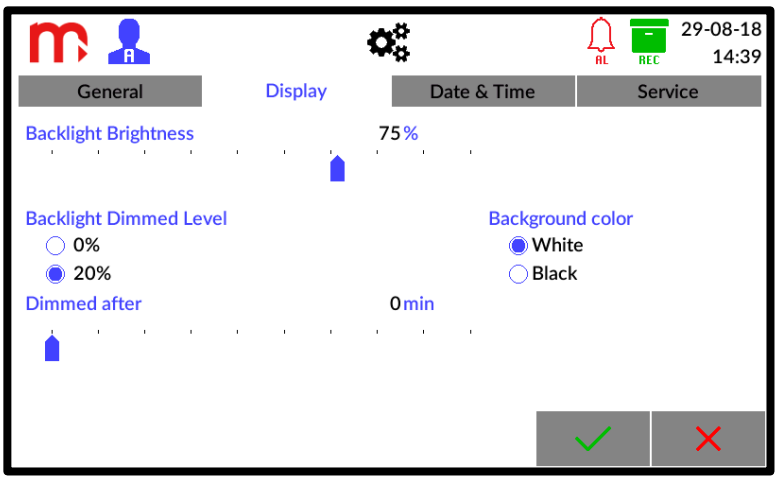


Fig. 11.1 An example view of the 'General' settings window – 'Display' tab.

11.1.1 General

Language: EN (ENGLISH) (EN (ENGLISH), DE (DEUTSCH), ES (ESPAÑOL), FR (FRANÇAIS), IT (ITALIANO), PL (POLSKI), PT (PORTUGUÊS))[1]

Device Tag: [text][2]

Device ID: 1[3]

Sound for buttons: Disabled (Disabled, Enabled)[4]

Sound for new alarms: Disabled (Disabled, Enabled)[5]

Changing DST: Disabled (Disabled, Enabled) [6]

[1]: Selection from the drop down list.
[2]: Enables to insert any description (name) of the device.
[3]: Device ID enables to assign an individual ID number. The ID is also included in archive files names.

! When using more devices it is recommended to assign individual ID to each one. It will allow to recognize the archive source by ID in the file name.

[4]: Turns on/off the button sound.
[5]: Turns on/off the sound for new alarms.
[6]: Turns on/off the automatic change of time into the summer time and back.

11.1.2 Display

Backlight Brightness[1]

Backlight Dimmed Level: 20% (0%, 20%)[2]

Background color: white (white, black)[3]

Dimmed after[4]

[1]: Setting screen brightness level during the operation from 21% to 100% (using slider).
[2]: Selection of the screen saver brightness level after the define idle time. User can choose two screen saver levels: 0% (the screen goes black) and 20%.
[3]: Setting the background color of the screen, two colors to choose from: white and black.
[4]: Setting the idle time after the elapse of which the screen goes dimmed (using slider); for *0 min* - the screen will not be dimmed.

11.1.3 Date & Time

Time field
Enables the setting of time in the hour/minute/second format. The changes are made using the three sliders. The current parameters are marked in red. After the change of settings, confirm the selected options by clicking on the **SET** button (below).

Date field
Enables setting the date in the day/month/year format. Setting the date is enabled by using the ‘calendar card’. Using the arrows in the top part of the field, set the relevant month and year, and then in the field below, the day of month, which after selecting will be marked with a rectangle filled with blue color. The current date is marked in a blue frame. After the change of settings, confirm the selected options by clicking on the **SET** button (below).

! After the confirmation of changes, the data will be changed immediately without rebooting the device.

11.1.4 Service

The 'Service' tab is only available to the Administrator and enables execute following tasks:

- **Restart** – results in restart of the device.
- **Restore Factory Settings** – using the function will result in deleting all of the earlier settings, the archive files created so far will not be deleted (more in section Factory settings).
- **Serial Number & MAC Address** – enables displaying the serial number and MAC address.

11.2 Input and output settings (I/O)

The window enables configuration of inputs and outputs. Switching between settings windows is possible by using tabs. The operating mode for each input/output can be defined independently. Confirm ✓ and cancel ✕ buttons are common for both sub-windows, clicking on these buttons results in toggles to the Main Menu.

In the I/O settings window only the hint regarding the correct connection of jumpers inside the device is displayed (not their current configuration). The ▮ symbol means shorted jumper, the ▯ symbol means opened jumper. Detailed information about the correct connection of jumpers is in the section Configuration of jumpers inside the device.

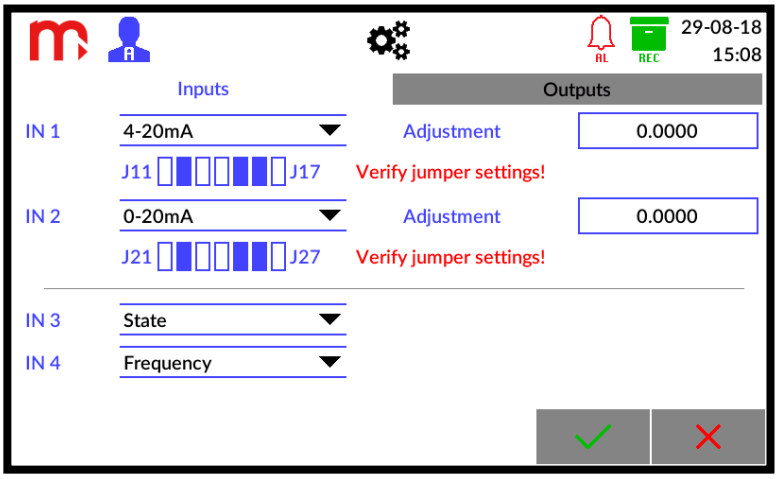


Fig. 11.2 An example view of the 'Inputs and Outputs' settings window.

11.2.1 Inputs

Inputs IN1 and IN2

Mode: 4-20mA (0-20mA, 4-20mA, -10V - +10V, 0-10V, R/RTD (2-w.))[1]

Adjustment: [value][2]

[1]: Selection of the operating mode for a given measurement input (IN1 or IN2) for receiving standard signals: *0-20mA*, *4-20mA*, *-10V - +10V*, *0-10V* or *R/RTD (2-w.)*.

[2]: It enables to add adjustment (offset) to the measured value.

Inputs IN3 and IN4

Mode: Disabled (Disabled, State, Frequency, Impulse)[1]

[1]: Depending on the configuration, the binary inputs can work in the state detection mode (*State*), frequency measurement (*Frequency*) or pulse counting (*Impulse*).

11.2.1 Outputs

Relay outputs (RL1 .. RL4)

Mode: Disabled (Disabled, Normally open, Normally closed, Pulsation)[1]

[1]: In the *Normally open* mode the relay circuit is closed when an event is reported (e.g. exceeded alarm-control threshold). In the *Normally closed* mode, the relay circuit is normally closed when idle, and is opened when an event is reported. *Pulsation* - when an event is reported, the relay circuit is closed and opened at approx. 1Hz frequency (e.g. a light indicator blinks - alarm notification). After the acknowledge, the relay output remains active if the threshold is still exceeded (the indicator is lit). If the exceeding returns to normal – the relay output will be inactive. In the *Disabled* mode, the selected relay output is open.
Note: SSR relays remain open in the event of power failure.

Analog output

Source: Channel 3 (Disabled, Channel 1, .., 6)[1]

[1]: Selection the output mode as switched off or as a retransmission of the selected channel value in the form of 4-20mA current loop.

4-20 mA span may be set as a sub-range of retransmitted channel span by entering the process values for 4 mA and 20 mA respectively.

Failure value: Disabled (Disabled, Constant)[3]

[2]: Setting the failure value.

11.3 Communication settings

The window has been divided into three sub-windows: Ethernet parameter settings, settings for sending E-mails and settings for RS-485 communication. Switching between settings windows is possible by using tabs.

Confirm ✓ and cancel ✗ buttons are common for all sub-windows, clicking on these buttons results in toggles to the Main Menu.

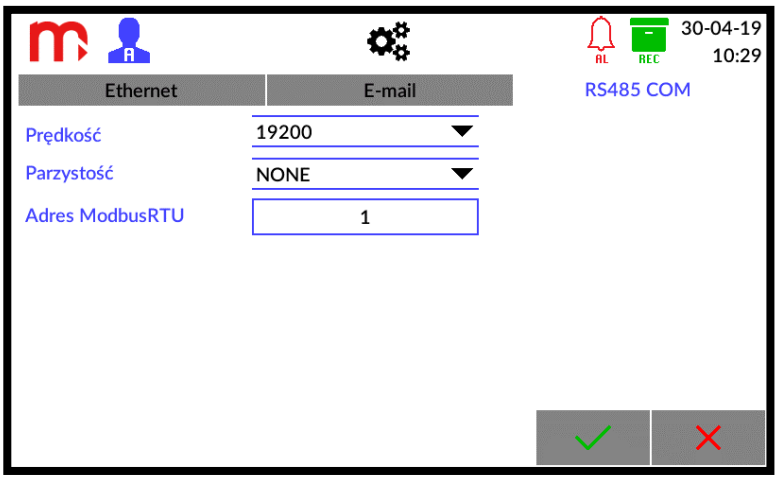


Fig. 11.3 An example view of the 'Communication' settings window.

11.3.1 Ethernet port

To ensure proper communication between the device and the master system, all communication parameters need to be configured.

IP address: [value][1]

ModbusTCP port: [value][2]

Mask: [value][1]

Gate: [value][1]

Primary DNS: [value][3]

Secondary DNS: [value][3]

[1]: These parameters should correspond to the network where the device is intended to operate.
[2]: It is recommended to use the 502 port dedicated to Modbus TCP, port 80 is not allowed (reserved for the device's web server).
[3]: A DNS address is necessary to use the e-mail function. Default DNS server settings: primary address 8.8.8.8, secondary address 8.8.4.4.

11.3.2 E-mail

The device can send automatic e-mails regarding alarm statuses and totalizers values. Before configuring the *E-mail* tab, configure the *Ethernet* tab and save the settings changes (exit the menu, the device will be restarted). The device must be connected to the network.

A message regarding alarm states is sent after exceeding at least one alarm threshold and after returning to the normal value (it is necessary to select the *E-mail Notification* option in the *Alarm 1* / *Alarm 2* tab, more in section Channels settings). If several alarm thresholds have been exceeded or the value has returned to normal at several channels, the device will send common information about these alarms. Subject of the e-mail: FP4, ALARM, device ID, device tag.

The message regarding the totalizers values is sent in accordance with the settings in the *Cyclic report* tab (it is necessary to select the *E-mail Notification* option in the *Σ1* / *Σ2* tab, more in section Channels settings). Subject of the e-mail: FP4, RP, device ID, device tag.

General tab

Enter information about the email account from which messages will be sent. Account outgoing server (SMTP) must be enabled. The maximum number of messages sent by email account per day should be taken into account.

E-mail: [value][1]

Login: [value][2]

Password: [value][3]

SMTP server: [value][4]

SMTP port: [value][5]

[1]: The full address of the email account from which messages will be sent.
[2]: The login used on the server to log into the e-mail account.

[3]: The password used on the server to log into the e-mail account.
[4]: The SMTP server address where the e-mail account is created.
[5]: The SMTP server port (without SSL) should be verified at the e-mail provider (ports 587 or 25 are used as default).

Recipients tab

Enter the e-mail addresses of message recipients into the table. The sender of the message (*General* tab) can be also the recipient of the message.

#: 1 (1, .., 5)[1]

E-mail: [value][2]

[1]: Ordinal number from 1 to 5, the message can be sent to a maximum of 5 recipients.
[2]: The full e-mail address of the recipient to which the messages will be sent.

It is recommended to check the correctness of the connection configuration using the **Test connection** button located below the table. Message about the connection is displayed, color indicates the status of the connection: green – message sent correctly to defined recipients, yellow – authorization error (check the correctness of entered data in the *General* tab and in the *Recipients* tab), red – connection error (check the Ethernet cable, network connection and settings of the IP address, mask and gate in the *Ethernet* tab).

The test message sent to the entered e-mail addresses contains the model, firmware, serial number, device ID and tag of the device. Subject of the e-mail: FP4, TEST, device ID, device tag.

Cyclic report tab

The cyclic report contains the values and units of the selected totalizers and the operating time of totalizers at the time of sending the message.

Mode: Daily (Disabled, Daily, Weekly, Monthly)[1]

Hour: 16 (0, .., 23)[2]

[1]: E-mail messages can be sent in the mode: *Daily* – select *Hour*, *Weekly* – select *Hour* and *Day of the week* or Monthly – select *Hour* and *Day of the month* of sending the message. The e-mail will be sent at the indicated time and will contain the values and units of the totalizers and the operating time of totalizers at the time of sending the message (data sent in the form of a table).
[2]: The e-mail is sent at the indicated full hour or each time after starting the device within the indicated hour.

11.3.3 RS-485 port

Recorder RS-485 port settings must correspond to the master device settings.

Baud Rate: 115200 (1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200)[1]

Parity: EVEN (NONE, EVEN, ODD)[2]

ModbusRTU Address: 1 (1, 2, .., 247)[3]

[1]: Baud Rate should be set to the highest possible value. For high distances or high interference level, data transmission speed may need to be decreased. Low transmission speed extends the reading time.

[2]: Parity control of each bite.
[3]: In RS-485 standard, up to 32 transmitters/receivers can be connected to the data transmission line. Each slave-type device must have a different address assigned.

For more information on Modbus registers addresses and data format refer to section MODBUS RTU / MODBUS TCP TRANSMISSION PROTOCOL.

11.4 Channels settings

The channel number is selected using the drop-down list, located in the upper left corner of the screen. The description of the channel can be edited by clicking on the text in the *Tag* field. Then, the screen keyboard will pop up.

The channels are permanently assigned to the inputs. Channels 1 and 2 correspond to analogue inputs IN1 and IN2, channels 3 and 4 correspond to analogue inputs IN3 and IN4, channels 5 and 6 are math channels (computing the formula entered by the user). Depending on the channel selection, different settings are available.

Switching between settings windows is possible by using tabs: *Inputs*, *General*, *Σ1*, *Σ2*, *Alarm 1* and *Alarm 2*. Confirm ✓ and cancel ✕ buttons are common for all sub-windows, clicking on these buttons results in toggles to the Main Menu.

! Settings of the individual channels may be copied and pasted to another measurement channel. Detailed information is given in section Copying channel settings.

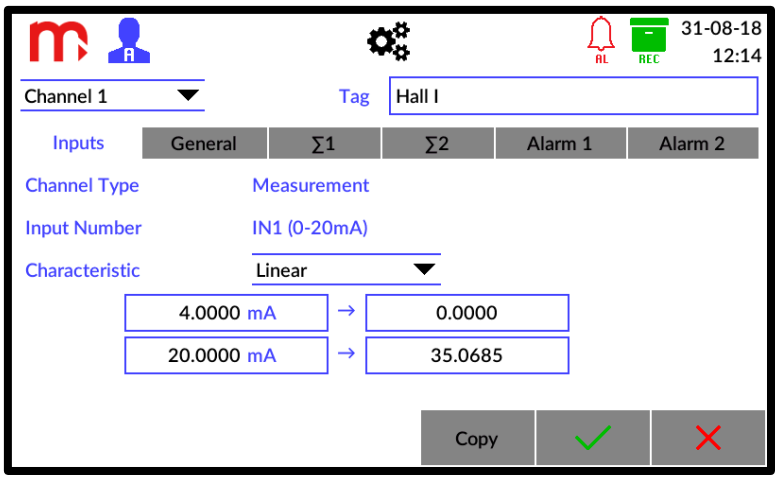


Fig. 11.4 An example view of the 'Channel' settings window (Measurement channel type, input IN1).

11.4.1 Inputs

Channels 1 and 2 (Analogue inputs IN1 and IN2)

Channel Type: Measurement[1]

Input Number: [number (mode)][2]

Characteristic: Linear (Linear, User, 1:1 (TEST), sensor)[3]

[1]: Information about the channel type - *Measurement*.
[2]: Information about the set operating mode for the input assigned to the channel.

[3]: The characteristic is typically set to *Linear*. Also there are available other setting options (for example User characteristic). For input in the R/RTD (2-w.) operating mode, there are characteristics of the individual sensor types available.

Channels 3 and 4 (PULS type inputs IN3 and IN4)

Channel Type: Measurement[1]

Input Number: [number (mode)][2]

Characteristic: Linear (Linear, User, 1:1 (TEST), State, Impulse)[3]

[1]: Information about the channel type - *Measurement*.
[2]: Information about the set operating mode for the input assigned to the channel.
[3]: For input in the *Frequency* operating mode: the characteristic is typically set to *Linear*, other setting options are also available (for example User characteristic). For input in the *Impulse* operating mode: the possibility of defining a value corresponding to a single pulse. For input in the *State* operating mode: option to define values corresponding to state 0 and 1.

Channels 5 and 6 (Math channels)

Channel Type: Computed[1]

Formula: Disabled (Disabled, Formula entered by the user)[2]

Characteristic: Linear (Linear, User, 1:1 (TEST))[3]

[1]: Information about the channel type - *Computed*.
[2]: Touching in the 'Formula' field results in toggling to the coefficients settings window (by default, the channel is set as *Disabled*).

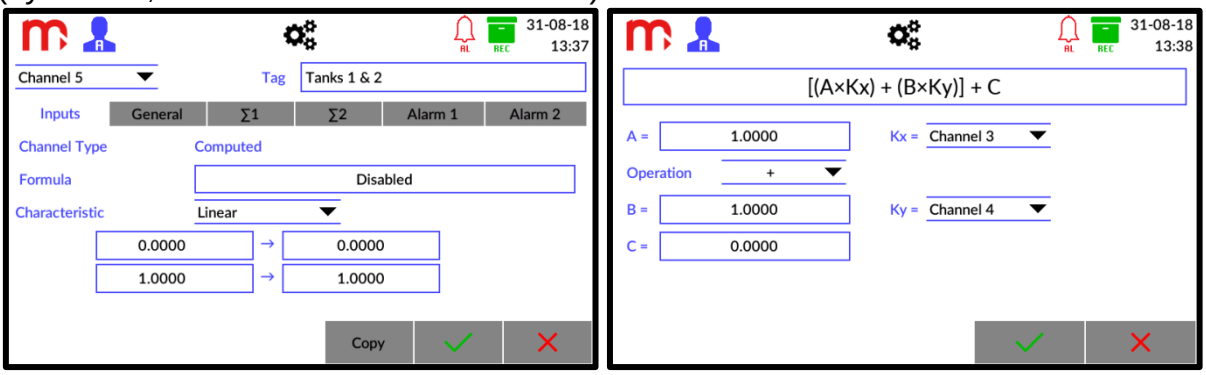


Fig. 11.5 Entering the formula in the Math Channel.

The **Operation** field enables the selection of one of the four available formulas using the drop-down list and symbols: +, -, ˣ, ÷.

Symbol	Formula
+	[(A×Kx) + (B×Ky)] + C
-	[(A×Kx) - (B×Ky)] + C
x	[(A×Kx) x (B×Ky)] + C
÷	[(A×Kx) ÷ (B×Ky)] + C

The coefficients **A**, **B** and **C** are constant values. The values of coefficients **A** and **B** is set as 1.0000 by default, the value of coefficient **C** is set as 0.0000 by default. Values of coefficients **Kx** and **Ky** can be selected using the drop-down list as 0.0 or as the value of the selected channel (*Channel 1 .. Channel 6*). To disable the channel, set the *Disabled* option in the **Operation** field.

[3]: The characteristic is typically set to *Linear*. Also there are available other setting options (for example User characteristic).

11.4.2 General

Unit: [None] (text)[1]

Time base: /s [/s, /m, /h][2]

Resolution: 0 (0, 0.0, 0.00, 0.000, 0.0000)[3]

Filter: Disabled (Disabled, 2s, 5s, 10s, 20s, 30s, 1min, 2min, 3min, 5min)[4]

Archiving: Disabled (Disabled, Enabled)[5]

Failure value: Disabled (Disabled, Constant [value])[6]

[1]: The unit is provided for information purposes only. User can put in any text string which does not affect the calculated or measured results displayed by the device.

[2]: The *Time base* is crucial only for flow measurements and totalizers calculation. In spite of *Unit* set above, it determines calculations for totalizes and flows according to */s* (per second), */m* (per minute) or */h* (per hour) setting.

[3]: The resolution defines the number of decimal places in the displayed result. It is unreasonable to set too high resolution for the measurement, because accuracy will not be improved (e.g. Pt100 sensor measurement set to three places after the decimal point will not provide for measurement accuracy of up to 0.001°C). However, if a filter is activated with sufficiently high time constant and if the resolution is reasonably increased, the changes can be identified more clearly.

[4]: The filter function “smoothes out” sudden surges in the measured values or eliminates signal noise. If the filter time constant is too high, the measurement value fluctuations can be falsified by "smoothing out" the ascending and descending slopes, or by eliminating short pulses. The filter time constant should be customized to the maximum speed of changes in the measured process.

[5]: It enables on/off the archiving of the results to a file in internal archive memory.

[6]: The failure value is the constant value which is displayed instead of the measurement result if the input signal fails or calculation result is out of range.

11.4.3 Totalizers

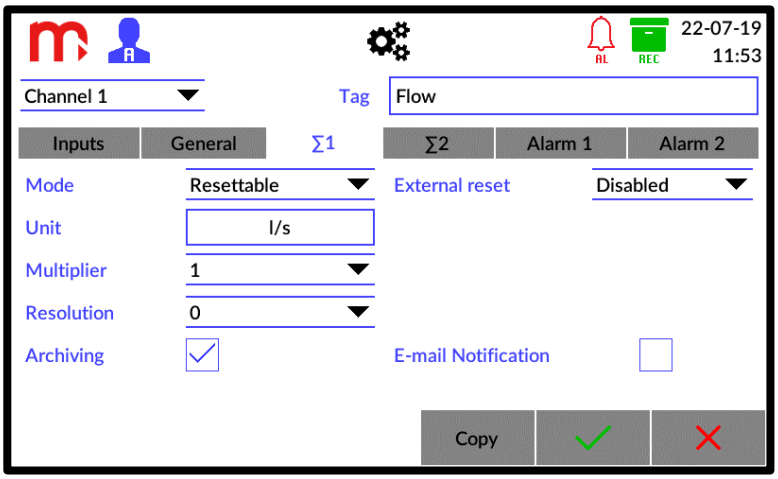


Fig. 11.6 An example view of the 'Channel' setting window – Totalizer 1 (Σ1).

Mode: Resettable (Disabled, Unresettable, Resettable, Daily, Weekly, Monthly)[1]

External reset: Disabled (Disabled, IN 3, IN 4)[2]

Unit: [l/s] (text)[3]

Multiplier: 1 (0.001, 1, 1000)[4]

Resolution: 0 (0, 0.0, 0.00, 0.000, 0.0000)[5]

Archiving: Enabled (Disabled, Enabled)[6]

E-mail Notification: Disabled (Disabled, Enabled)[7]

[1]: Each totalizer may be set in one of the six options: *Disabled* – values are not counted, *Unresettable* – user cannot zero the totalizer, *Resettable* – user can zero the totalizer at any moment, *Daily* – the totalizer resets at 0:00 every day, *Weekly* – the totalizer resets at 0:00 every Monday, *Monthly* – the totalizer resets at 0:00 every first day of month.

[2]: The external reset function is available only in the *Resettable* Mode. Totalizer and timer values can be reset externally with using the PULS input (IN 3 or IN 4) in any type of mode (it is recommended to select the *State* mode in the I/O settings window). The reset occurs for the 0 value at the PULS input (for example, for the OC/contact jumper configuration and *State* mode, the 0 value occurs for a short circuit). The PULS type input can be used for simultaneously reset several totalizers.

CAUTION! It has to be remembered that the input used to reset the totalizer value must be enabled in the I/O settings window (recommended mode: *State*).

[3]: The unit is provided for reference purposes only. User can enter any unit which does not affect the results displayed by the device.

[4]: The multiplier allows multiplication of the measurement results by one of the three values selected from the list. For example, if a flow meter is connected to the device measuring the flow in m^3/s and the user wants the result to be displayed in dm^3/s, the multiplier should be set to 1000. In a reverse situation, when the measurement would be made in dm^3/s and the user would like the values counted by the totaliser to be displayed in m^3/s, the value of the multiplier should be set to 0.001.

CAUTION! It has to be remembered that the multiplier value does not determine the displayed unit and vice versa.

[5]: The number of decimal places displayed. It has no effect on the calculation accuracy and can be changed any time without affecting the totalizer status.

[6]: Enables on/off the totalizer archiving. Selecting the check-box is equivalent to switching on the archiving.

[7]: Enables adding the totalizer value to an e-mail sent in the form of a cyclic report (E-mail settings).

11.4.1 Alarm

Mode: Low (Disabled, Low, High)[1]

Type: Control (Alarm, Control)[2]

Level: [1.5670] (value)[3]

Hysteresis: [None] (value)[4]

Colour: Green (Disabled, Green, Yellow, Red)[5]

Output: RL1 (--, RL1, .., RL4)[6]

Change the frequency of archiving: Disabled (Disabled, Enabled)[7]

Log event: Enabled (Disabled, Enabled)[8]

E-mail Notification: Enabled (Disabled, Enabled)[9]

[1]: The threshold can be set to *High* (active above a specific level) or *Low* (active below a specific level) operation mode.

[2]: Setting of the *Type: Alarm* (or so called latched mode) allows to indicate the alarm notification with confirmation procedure. *Type: Control* (or so called non-latched mode) allows to indicate the threshold status or use relays outputs to set a simple on/off control (e.g. heating or cooling).

[3]: The alarm threshold level value is entered in the measured value units assigned.

[4]: The hysteresis value is the difference between the threshold value exceedance and return to normal. The threshold hysteresis value is entered in units of the measured value assigned to a specific measurement channel. For example, for a threshold set to *High*, 48 °C threshold level and 0.5 °C hysteresis means that the threshold will be exceeded above 48 °C, and will return to normal below 47.5 °C (48-0.5). For a threshold set to *Low*, -15 °C threshold level and 0.2 °C hysteresis means the threshold will be exceeded below -15 °C, and will return to normal above -14.8 °C (-(15-0.2)).

[5]: Each alarm/control threshold can have a colour assigned. If the threshold is exceeded, the measurement result is displayed in a different colour: *Green*, *Yellow* or *Red* (assigned to this alarm).

[6]: The drop down list enables selecting a suitable relay output.

[7]: The recording of measurement results can be controlled by alarm/control thresholds. Two different recording speeds can be set. The exceeded threshold can switch from MAIN ARCHIVE interval I to MAIN ARCHIVE interval II – more information about archive interval in section Archive settings.

[8]: Enabling the option switches on the archiving of the thresholds exceeded to the event file.

[9]: Enabling the option activates the function of informing about exceeding the alarm / control threshold and returning to the normal value by means of e-mails (E-mail settings). An e-mail about returning to the normal value will be sent automatically for the *control* alarm type, for the *alarm* type after the confirmation the alarm.

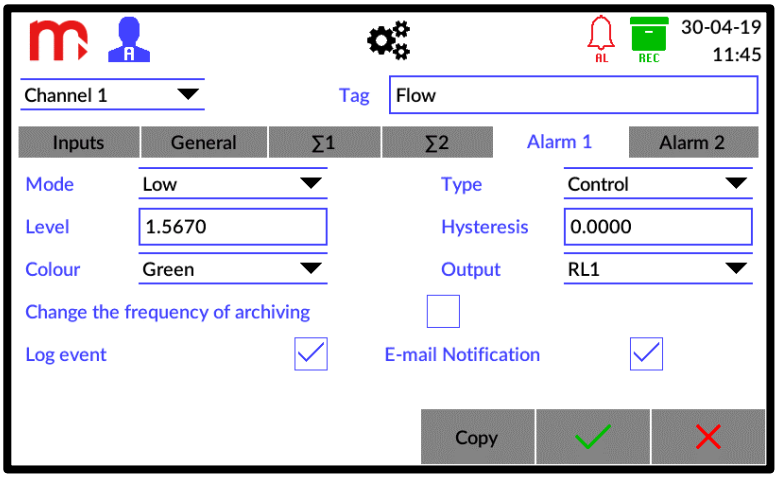


Fig. 11.7 An example view of the 'Channel' setting window – Alarm 1.

11.5 Archive settings

Selection of archive work settings is possible using drop-down lists.

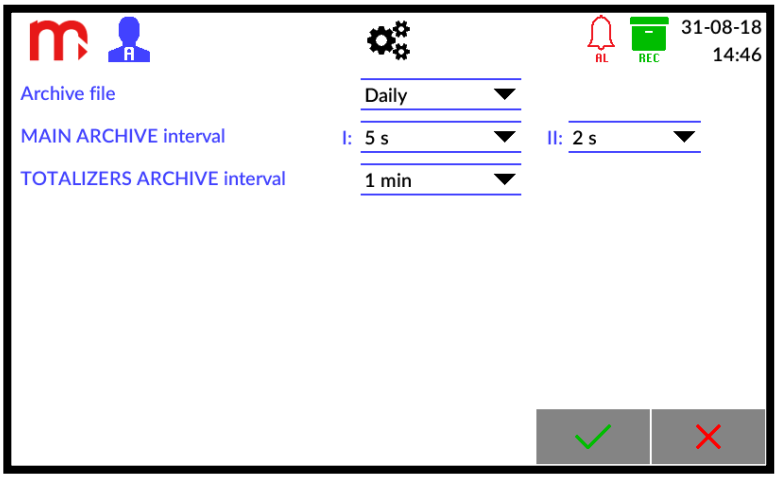


Fig. 11.8 An example view of the 'Archive' setting window.

Archive file: Daily (Daily, Weekly, Monthly)[1]

MAIN ARCHIVE interval
I: 5s (2s, 5s, 10s, 15s, 30s, 1min, 5min, 10min, 15min, 30min, 1h, 2h, 4h, 12h, 24h)[2]
II: 2s (2s, 5s, 10s, 15s, 30s, 1min, 5min, 10min, 15min, 30min, 1h, 2h, 4h, 12h, 24h)[3]

TOTALIZERS ARCHIVE interval: 1min (1min, 5min, 10min, 15min, 30min, 1h, 2h, 4h, 12h, 24h)[4]

[1]: The archiving files are created in the daily, weekly and monthly system: *Daily* – device creates new archive files at 0:00 every day, *Weekly* – device creates new archive files at 0:00 every Monday, *Monthly* – device creates new archive files at 0:00 every first day of month.

[2]: The basic MAIN ARCHIVE time interval (I). Recording interval should correspond to the measurement process. If the recording interval is too short, the large data volumes will make it difficult to analyse the results. If the recording interval is too long, rapid changes in the measured values cannot be identified.

[3]: The second MAIN ARCHIVE time interval (II) is used when the recording is controlled by exceeded alarm/control thresholds (see section Alarm).

[4]: The time interval with which the totalizers data are saved in the archive.

12 ARCHIVE

12.1 Start, resume and stop archiving

To display Archive window, use arrows: 〈 and 〉. To display arrows, touch the screen.

Using the function buttons, it is possible to start, resume or stop the archiving process.

In the left bottom corner of the screen, there is a button which may start the archiving process START or stop it STOP.

To create a new archive, in first step stop the archiving process and then press the New Archive button. After creating a new archive file, it is necessary to start the archivization (press **START** button).

! Turning off the power supply may cause the loss of a few last records (approx. 1 minute).

12.2 Archive settings

The archive settings are available after clicking the icon on the title bar, and then the archive icon (detail in section Archive settings).

12.3 Archive files types

There are three archive file types:

- Data archive (file name organization: *YY**AD**XX.csv*)
- Totalizer archive (file name organization: *YY**AT**XX.csv*)
- Event archive (file name organization: *YY**AE**XX.csv*)

XX - successive archive file number, starts from 01 and ends at 99. If this number is exceeded, the numbering is resumed from 01.

YY - device ID; it is consistent with the user settings, in case of change the ID, a new file will be created.

Each archive is recorded in the *.csv format (standard spreadsheet text format).

12.4 Way of creating an archive file

The archive file with a new archive number is created in the following cases:

- creating a new file by the user,
- cyclically (daily, weekly, monthly), according to the set parameter,
- changing parameters, necessitating the creation of a new file.

A new archive file is created in case of the absence of an archive file.

12.5 Time interval of archiving data

Process Values records are saved every 2 s, 5 s, 10 s, 15 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 1 h, 2 h, 4 h, 12 h, 24 h, according to the settings. More information in section Archive settings.

Totalizers records are saved every 1 min, 5 min, 10 min, 15 min, 30 min, 1 h, 2 h, 4 h, 12 h, 24 h, according to the settings. More information in section Archive settings.

Record in event archive is added when the event occurs (e.g. power on/off, alarm exceeded, device parameters changed, user login).

12.6 Archive files organization

Each archive file contains a header, with the following information:

DEVICE MODEL, FW VERSION, SERIAL NUMBER, ID, NUMBER OF ROW, ARCHIVE TYPE, CRC1

DEVICE MODEL – device model, for FP4/FP4W it is FP4
FW VERSION – the firmware version in which the archive was created, updating the FW will always result in the creation of a new archive
SERIAL NUMBER – serial number of the device
ID – device ID
NUMBER OF ROW – information about the number of rows in the header
ARCHIVE TYPE – archive type: DATA (process value archive), EVENT (event archive), TOT (totalizer archive)
CRC1 – CRC control

The process values archive and totalizers archive also has an additional archive header, which contains information about set parameters (selected channels, description, unit, etc.).

12.6.1 Data archive

Organization of additional header in the data archive file:

CHANNEL, DESCRIPTION, UNIT

CHANNEL – the channel number
DESCRIPTION – channel description, depending on the settings in the device
UNIT – unit assigned to the channel

Organization of records in the data archive file:

DATE, TIME, DST, CHANNEL 1, CHANNEL 2, … , CHANNEL 6, CRC2

DATE – date of the record in YY-MM-DD format
TIME – time of the record in HH:MM:SS format
DST – information about summer (1) or winter (0) time enabled
CHANNEL X – value (X – channel number from 1 to 6)
CRC2 – CRC control

12.6.2 Totalizer archive

Organization of additional header in the totalizers archive file:

CHANNEL, DESCRIPTION, TOTALIZER 1 TYPE, TOTALIZER 1 UNIT, TOTALIZER 2 TYPE, TOTALIZER 2 UNIT

CHANNEL	– the channel number
DESCRIPTION	– channel description, depending on the settings in the device
TOTALIZER 1 TYPE/ TOTALIZER 2 TYPE	– totalizer operation mode: ‘ ’ – disabled; ‘1’ – unresettable; ‘2’ – resettable; ‘3’ – daily; ‘4’ – weekly; ‘5’ – monthly
TOTALIZER 1 UNIT/ TOTALIZER 2 UNIT	– unit assigned to the totalizer

Organization of records in the totalizers archive file:

DATE, TIME, DST, CHANNEL1: TOTALIZER1, CHANNEL1: TIMER1, CHANNEL1: TOTALIZER2, CHANNEL1: TIMER2, … , CHANNEL6: TIMER2, CRC2

DATE	– date of the record in YY-MM-DD format
TIME	– time of the record in HH:MM:SS format
DST	– information about summer (1) or winter (0) time enabled
CHANNEL X: TOTALIZER Y	– value of totalizer (X – channel number from 1 to 6; Y – totalizer number: 1 or 2)
CHANNEL X: TIMER Y	– the value of the timer which counts the operation time of totalizer 1 or 2, the value is in seconds (X – channel number from 1 to 6; Y – timer number: 1 or 2)
CRC2	– CRC control

12.6.3 Event archive

Organization of records in the events archive file:

DATE, TIME, DST, EVENT CODE, CRC2

DATE	– date of the record in YY-MM-DD format
TIME	– time of the record in HH:MM:SS format
DST	– information about summer (1) or winter (0) time enabled
EVENT CODE	– event code (more information below)
CRC2	– CRC control

The event archive records the following events:

SYS:STOP	– Power supply switched off
SYS:START	– Power supply switched on
ARCH:NEW	– Created a new archive file
ARCH:STOP	– Stopped archivization of data/totalizers
ARCH:START	– Started archivization of data/totalizers
SYS:NEW SETTINGS	– New settings saved
SYS:TIME CHANGED	– Changed time

SYS:DATE CHANGED	– Changed date
SYS:CHx: AUX VALUES RESET	– Reset auxiliary values for "x" channel (totalizers, timers)
SYS: ALL CHANNELS: AUX VALUES RESET	– Reset auxiliary values on all channels (totalizers, timers)
TOT:REMOTE RESET BY INx	– External reset of the totalizer and timer value using the PULS type input with the "x" number (IN3, IN4)
AL:ACK	– Acknowledged alarms
AL:CHx ALy ON	– Activated the "y" alarm on the "x" channel
AL:CHx ALy OFF	– Deactivated the "y" alarm on the "x" channel
EMAIL:OK	– Sending an e-mail
EMAIL:ERROR	– Attempt to send e-mail messages failed
SYS:INPUT BOARD RESET	– Restarted the measuring board
SYS:WATCHDOG RESET	– Restarted the device due to Watchdog timeout
SYS:LOGIN: xxxxx	– Login user xxxxx
SYS:LOGOUT	– Logout the user

12.7 Copying archive files from the device

Copying archive files from the device is possible in two ways: using a USB flash memory (a USB stick) or using an Ethernet connection and the device web server.

12.7.1 Copying archive files to USB flash memory

Connect the USB flash memory to the USB port in the front panel of the device. Click on the icon from the title bar, then click on the icon .

Process of deleting and copying files to USB is described in the USB section.

12.7.2 Copying archive files using device web server

Archive files can be copied using the device web server. Connect the device using the Ethernet connection and follow the instruction from section Web server.

13 ADDITIONAL FUNCTIONS

13.1 Additional channel functions

13.1.1 User characteristics

User characteristics are given in the form of a pair of points: the value of the measured resistance, current, voltage, etc. (x value) and the value displayed in the corresponding units (y value). The user has the ability to add (**Add point**), delete (**Delete point**), and edit (**Edit value**) points of the characteristic, with a minimum of 2 points and a maximum of 100. User has the ability to add up to 10 characteristics.

To add a new characteristic, in the **Channel** settings window, select from the drop-down list in field Characteristics: *User*, then select one of the ten available positions and select **View** button. Changing the characteristic tag after clicking on the current one in the *Tag* field.

New points can be added in any order (**Add point**), because they are automatically recognized and sorted relative to the measured value x. To delete a point, select it by clicking and then select the **Delete point** button. To edit a point, select it by clicking and then select the **Edit Point** button.

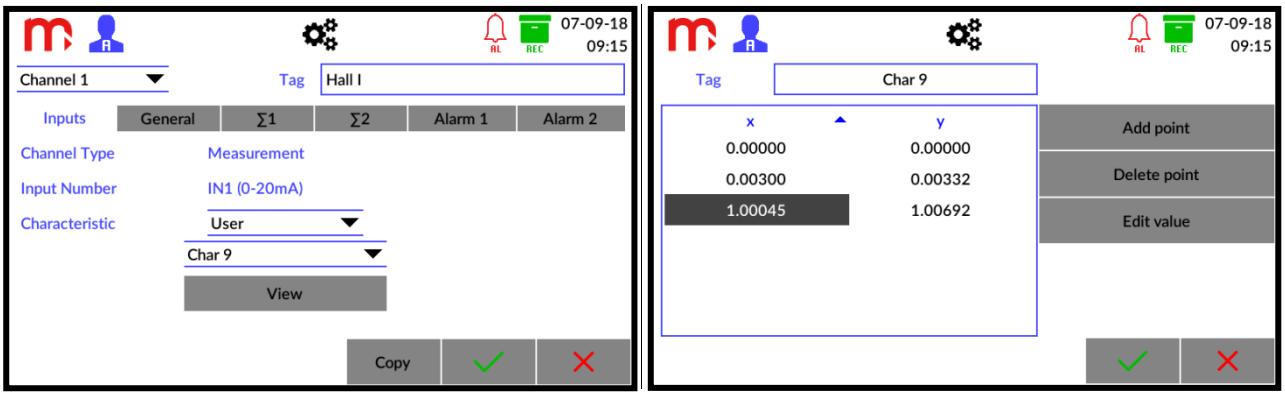


Fig. 13.1 An example view of the 'Channel' settings window (edition of user characteristics).

Two identical measurement values x cannot be entered for the same characteristic. The entered data will be treated as erroneous and will be highlighted in red.

After entering the points for the characteristic, confirm the willingness to make changes by pressing the ✓ button. To cancel implemented changes, press the ✗ button.

In the *FP4 Config* program it is possible to add a characteristic from the computer level. The file with characteristics points must be in *.csv format. The columns in the file must be signed as 'x' (previous column) and 'y' (next column). Use a decimal point.

13.1.2 Copying channel settings

The device enables copying the settings assigned to a particular measurement channel and pasting them into another channel. It allows to speed up the programming when there are channels to be programmed with using the same settings. After pasting, change the name (Tag) of the channel. All data from *General*, *Σ1*, *Σ2*, *Alarm 1* and *Alarm 2* tabs are copied. In Inputs tab, only the characteristic is copied - if copied settings is available in both channels (if it is not available in both channels, the characteristic setting will not be changed).

To copy the settings, from the list in the top part of the **Channels** setting window select the channel which is to be copied and then select the Copy button. Then, choose the channel to which the settings are to be copied and click the Paste button. Both function buttons are located in the bottom of the screen.

13.2 Print screen

To use the print screen option click on the manufacturer's logo on the title bar. During this operation, the screen will be inactive for a few seconds and the process will be signalled by a green diode situated on the front panel of the device. When the process is completed, an information will be displayed on the screen. Confirm the information.

Internal memory of the device may store up to 10 print screen numbered from 0 to 9. If this number is exceeded, the numbering is resumed from 0, and the images are overwritten. All files are saved in the *.bmp format.

To copy the image from the internal device memory to a connected USB flash memory, use the icon from the title bar and then click on the icon.

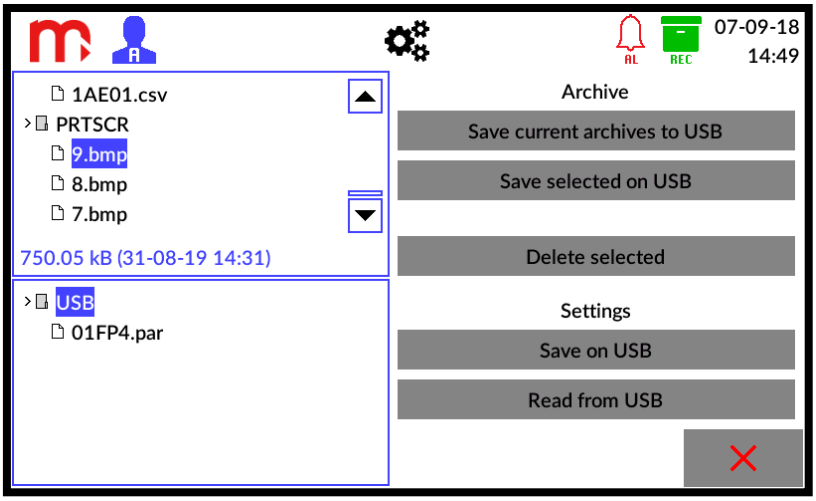


Fig. 13.2 Saving the print screen file.

Among the files situated in the window on the left side of the screen, from the **PRTSCR** folder select the file to be copied (folder is at the bottom of the list). The selection will be confirmed by marking the name in blue. Then, from the menu on the right side click on the **Save selected on USB** button.

13.3 Web server

The web server enables viewing the table with values of channels, totalizers and timers and downloading archive files using a web browser.

In order to start the web server, the IP address of the device (information available in the Information about the device window) should be placed in the browser's address bar.

The IP address should be configured in the menu of the device, in Communication setting window (→ → **Ethernet** tab).

Choose language by clicking on the appropriate flag icon. Then, log in with the **User's** password. In case that this password is disabled, press the **Login** button without entering any characters.

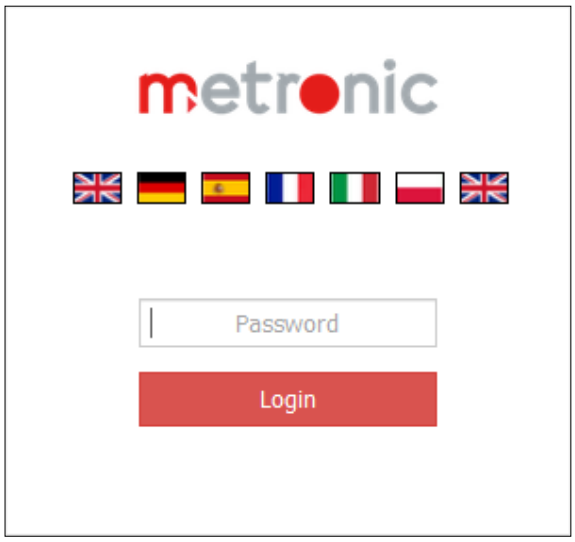


Fig. 13.3 Login to the web server.

The web server enables viewing the table with values measured and counted by the device. To show up the table choose: *Results Tables* → *Channels*. The table shows values for all channels, counters and timers (if they are enabled). It should be taken into account, that the page is not refreshed automatically. To refresh data, press the **Refresh** button at the bottom of the screen.

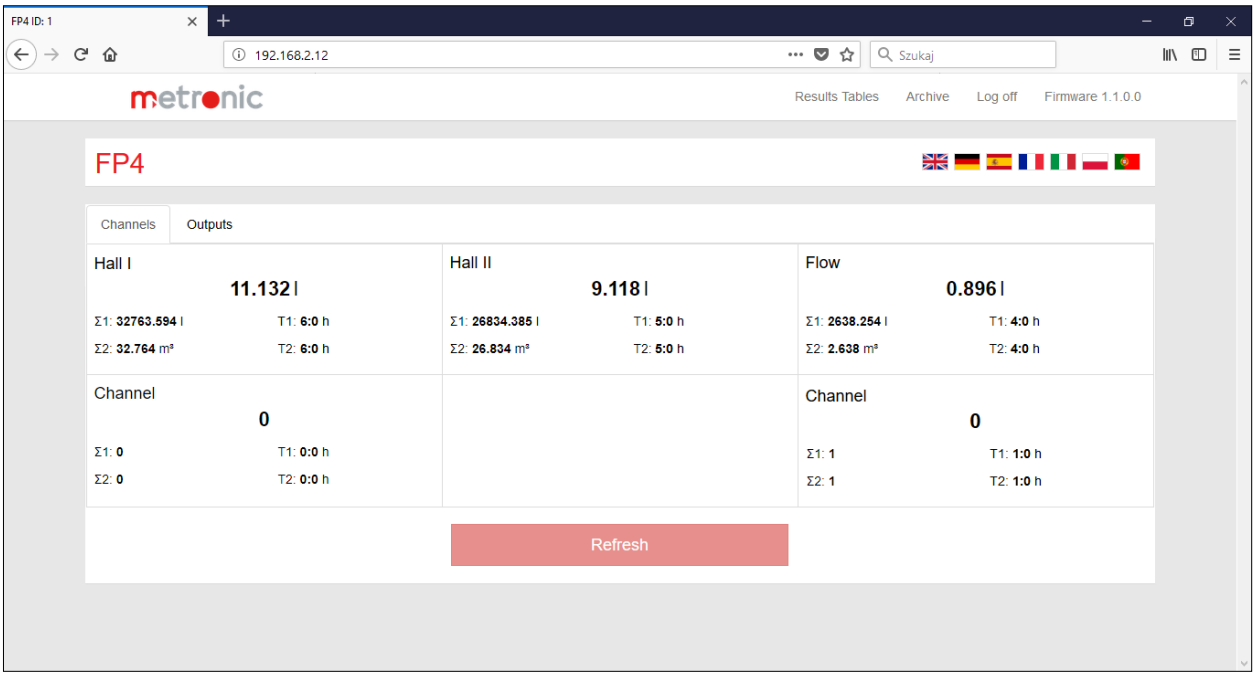


Fig. 13.4 Web server – Results Tables (Channels).

The web server also shows the status of outputs in the device (*Results Tables* → *Outputs*), if the analogue output or at least one relay output is enabled. The tab presents the status of the analogue output (the '------' sign means that the analogue output disabled)

and the state of output relays marked as RL1-RL4 (the ■ icon indicates that the output is closed, the □ icon indicates that the output is opened). It should be taken into account, that the page is not refreshed automatically. To refresh data, press the **Refresh** button at the bottom of the screen.

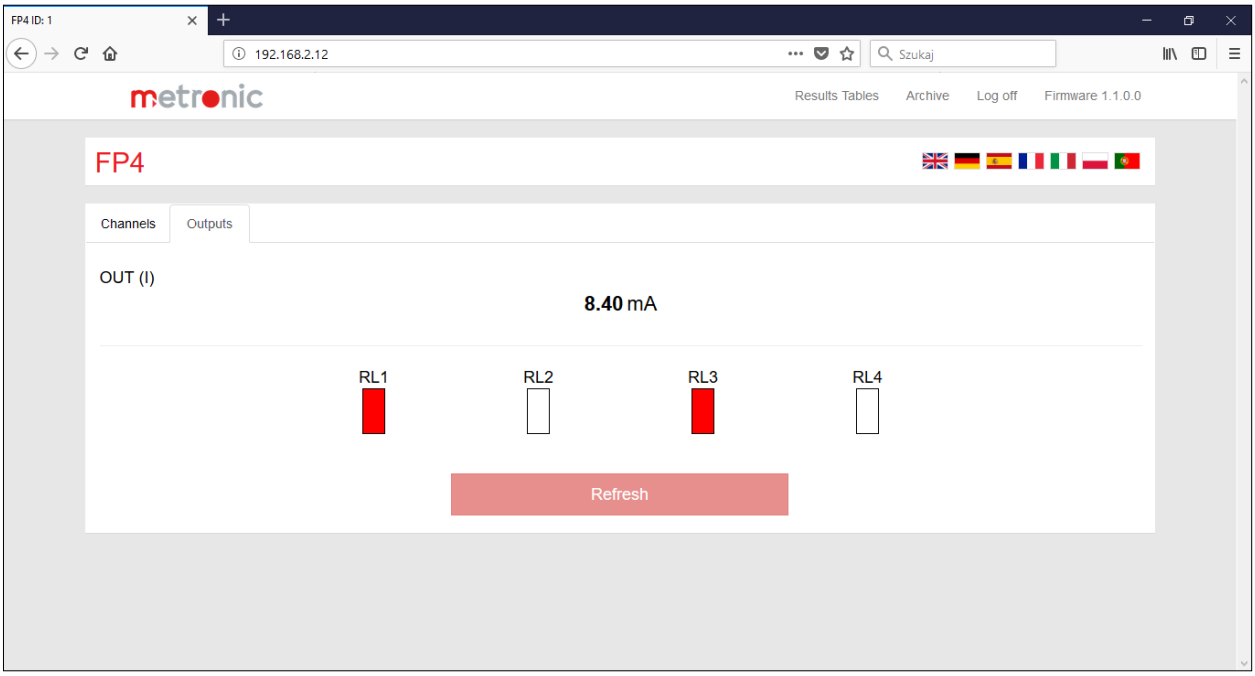
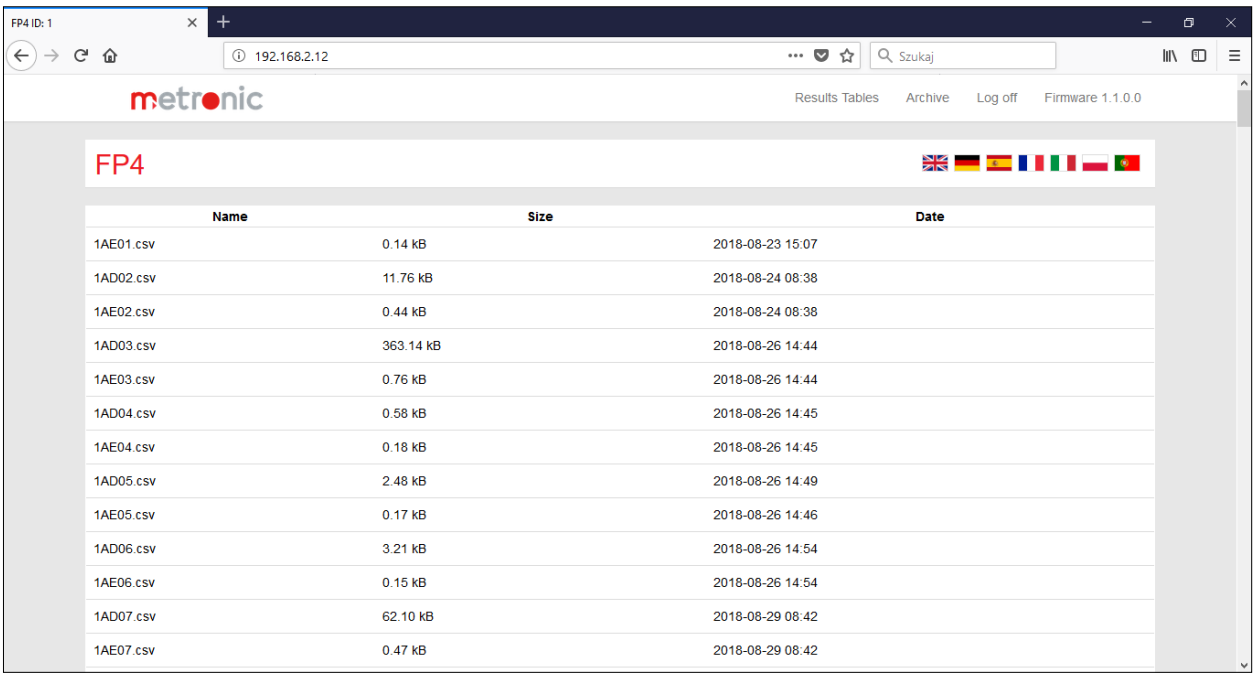


Fig. 13.5 Web server – Outputs.

The list of archive files is in *Archive* tab. The files are downloaded to the computer by clicking on the assigned archive name in the list of archive files. It is possible to sort archive files by pressing on the name of the column header in the table.



Name	Size	Date
1AE01.csv	0.14 kB	2018-08-23 15:07
1AD02.csv	11.76 kB	2018-08-24 08:38
1AE02.csv	0.44 kB	2018-08-24 08:38
1AD03.csv	363.14 kB	2018-08-26 14:44
1AE03.csv	0.76 kB	2018-08-26 14:44
1AD04.csv	0.58 kB	2018-08-26 14:45
1AE04.csv	0.18 kB	2018-08-26 14:45
1AD05.csv	2.48 kB	2018-08-26 14:49
1AE05.csv	0.17 kB	2018-08-26 14:46
1AD06.csv	3.21 kB	2018-08-26 14:54
1AE06.csv	0.15 kB	2018-08-26 14:54
1AD07.csv	62.10 kB	2018-08-29 08:42
1AE07.csv	0.47 kB	2018-08-29 08:42

Fig. 13.6 Web server – list of archive files.

13.4 Software for PC

13.4.1 FP4 Config

The program is used to commission the device parameters. The parameters between the device and the program are transferred with using *.par files.

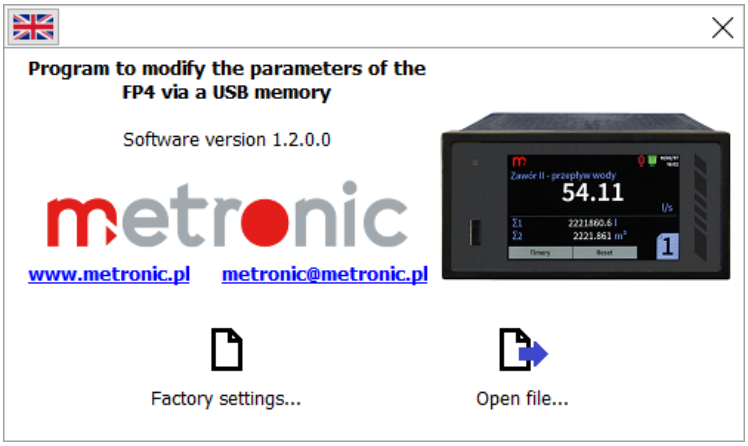


Fig. 13.7 An example view of the FP4 Config program.

13.4.2 FP4-RP (FP4RPplus)

The program is used for analysis and visualization of measurement results. Depending of the archive type, measurement results may be presented in a graph or in the table form.

In extended version *FP4-RPplus.exe* there is possibility to download archive files from the device via Ethernet connection.

Detailed information is in instruction manual for the FP4-RP program.

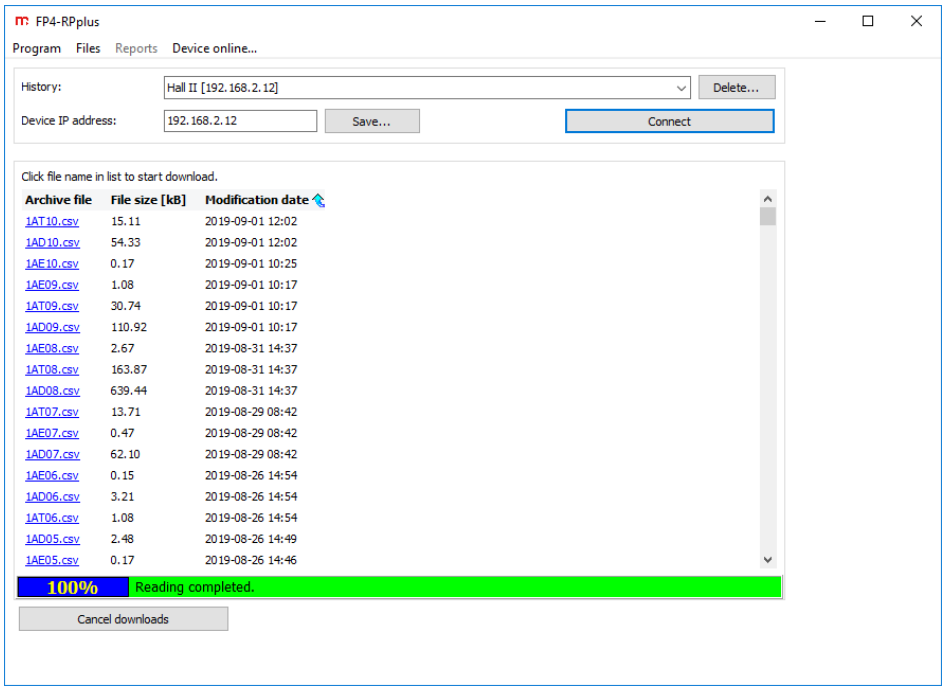


Fig. 13.8 An example window view in the FP4-RPplus program, downloading archive files from the device via Ethernet connection.

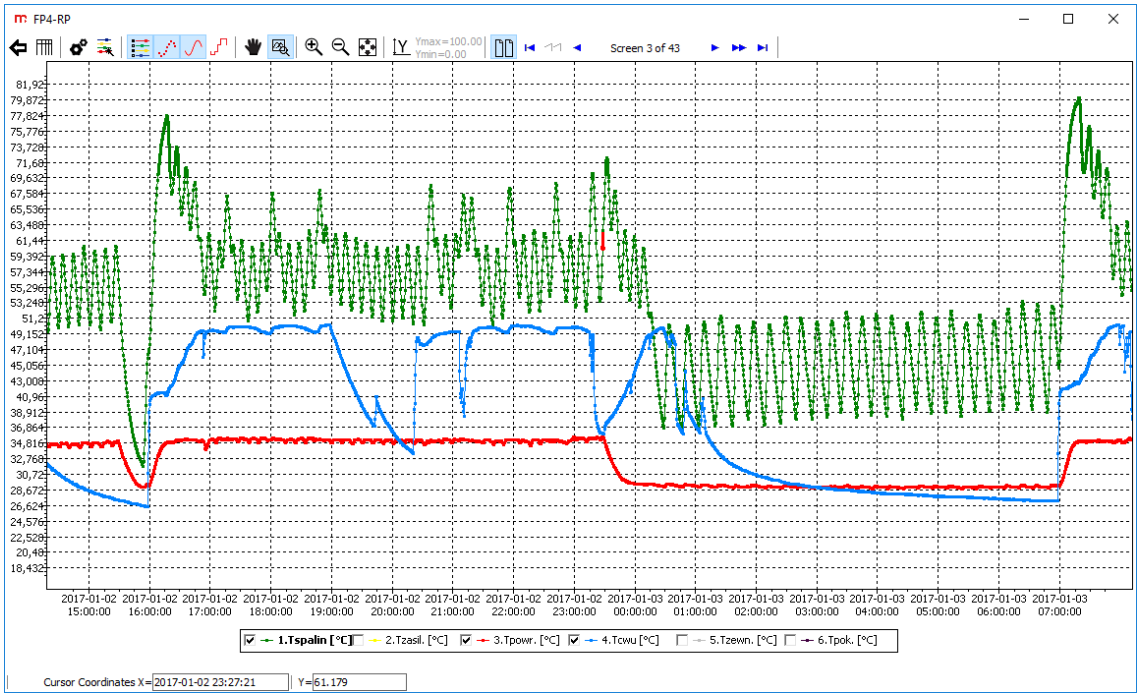
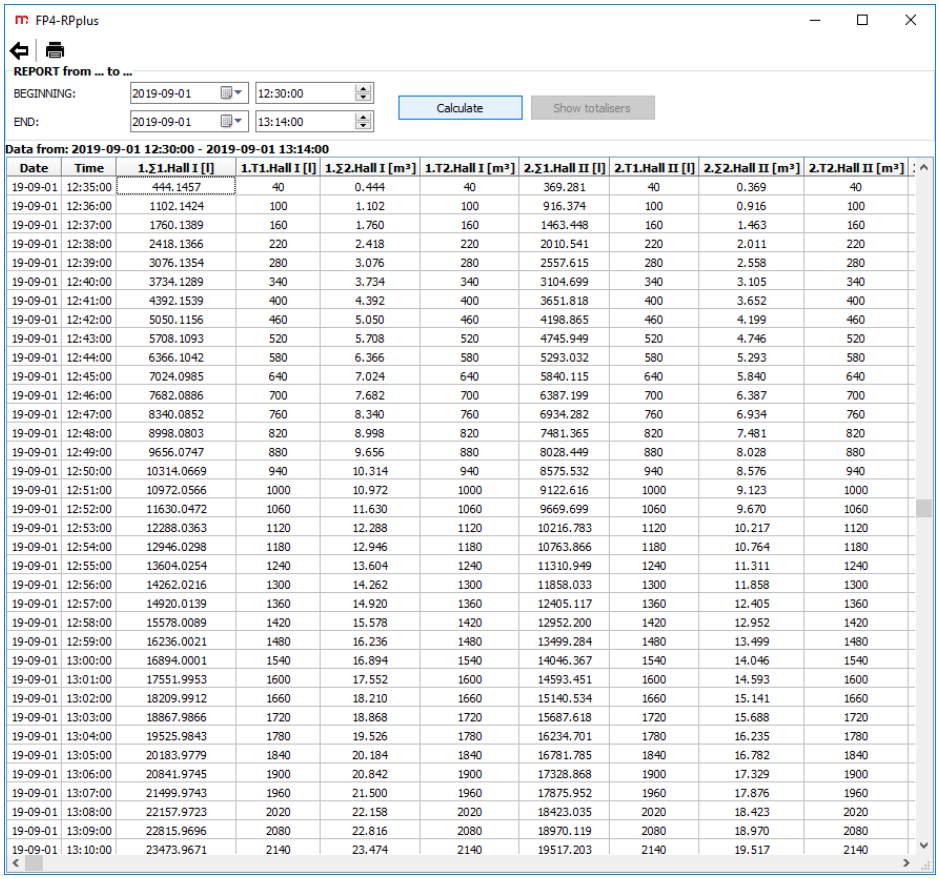


Fig. 13.9 An example window view in the FP4-RP program, data presented in a graph (data archive).



FP4-RPplus

REPORT from ... to ...

BEGINNING: 2019-09-01 12:30:00

END: 2019-09-01 13:14:00

Calculate | Show totalisers

Data from: 2019-09-01 12:30:00 - 2019-09-01 13:14:00

Date	Time	1.∑1.Hall I [l]	1.T1.Hall I [l]	1.∑2.Hall I [m³]	1.T2.Hall I [m³]	2.∑1.Hall II [l]	2.T1.Hall II [l]	2.∑2.Hall II [m³]	2.T2.Hall II [m³]
19-09-01	12:35:00	444.1457	40	0.444	40	369.281	40	0.369	40
19-09-01	12:36:00	1102.1424	100	1.102	100	916.374	100	0.916	100
19-09-01	12:37:00	1760.1389	160	1.760	160	1463.448	160	1.463	160
19-09-01	12:38:00	2418.1366	220	2.418	220	2010.541	220	2.011	220
19-09-01	12:39:00	3076.1354	280	3.076	280	2557.615	280	2.558	280
19-09-01	12:40:00	3734.1289	340	3.734	340	3104.699	340	3.105	340
19-09-01	12:41:00	4392.1539	400	4.392	400	3651.818	400	3.652	400
19-09-01	12:42:00	5050.1156	460	5.050	460	4198.865	460	4.199	460
19-09-01	12:43:00	5708.1093	520	5.708	520	4745.949	520	4.746	520
19-09-01	12:44:00	6366.1042	580	6.366	580	5293.032	580	5.293	580
19-09-01	12:45:00	7024.0985	640	7.024	640	5840.115	640	5.840	640
19-09-01	12:46:00	7682.0886	700	7.682	700	6387.199	700	6.387	700
19-09-01	12:47:00	8340.0852	760	8.340	760	6934.282	760	6.934	760
19-09-01	12:48:00	8998.0803	820	8.998	820	7481.365	820	7.481	820
19-09-01	12:49:00	9656.0747	880	9.656	880	8028.449	880	8.028	880
19-09-01	12:50:00	10314.0669	940	10.314	940	8575.532	940	8.576	940
19-09-01	12:51:00	10972.0566	1000	10.972	1000	9122.616	1000	9.123	1000
19-09-01	12:52:00	11630.0472	1060	11.630	1060	9669.699	1060	9.670	1060
19-09-01	12:53:00	12288.0363	1120	12.288	1120	10216.783	1120	10.217	1120
19-09-01	12:54:00	12946.0298	1180	12.946	1180	10763.866	1180	10.764	1180
19-09-01	12:55:00	13604.0254	1240	13.604	1240	11310.949	1240	11.311	1240
19-09-01	12:56:00	14262.0216	1300	14.262	1300	11858.033	1300	11.858	1300
19-09-01	12:57:00	14920.0139	1360	14.920	1360	12405.117	1360	12.405	1360
19-09-01	12:58:00	15578.0089	1420	15.578	1420	12952.200	1420	12.952	1420
19-09-01	12:59:00	16236.0021	1480	16.236	1480	13499.284	1480	13.499	1480
19-09-01	13:00:00	16894.0001	1540	16.894	1540	14046.367	1540	14.046	1540
19-09-01	13:01:00	17551.9953	1600	17.552	1600	14593.451	1600	14.593	1600
19-09-01	13:02:00	18209.9912	1660	18.210	1660	15140.534	1660	15.141	1660
19-09-01	13:03:00	18867.9866	1720	18.868	1720	15687.618	1720	15.688	1720
19-09-01	13:04:00	19525.9843	1780	19.526	1780	16234.701	1780	16.235	1780
19-09-01	13:05:00	20183.9779	1840	20.184	1840	16781.785	1840	16.782	1840
19-09-01	13:06:00	20841.9745	1900	20.842	1900	17328.868	1900	17.329	1900
19-09-01	13:07:00	21499.9743	1960	21.500	1960	17875.952	1960	17.876	1960
19-09-01	13:08:00	22157.9723	2020	22.158	2020	18423.035	2020	18.423	2020
19-09-01	13:09:00	22815.9696	2080	22.816	2080	18970.119	2080	18.970	2080
19-09-01	13:10:00	23473.9671	2140	23.474	2140	19517.203	2140	19.517	2140

Fig. 13.10 An example window view in the FP4-RPplus program, data presented in a table (totalizer archive).

14 FAILURE SYMBOLS

Fault situation related to a particular channel are marked with a relevant symbol on the display:

--------	Channel switched off (analogue output switched off), for the switched off channels the single result window is not displayed.
-----	Exceeding the measuring range, a value is less or equal to -99999999999999 or a value is greater than or equal to 99999999999999. The symbol is saved in the archive and sent in an e-mail.
---W---	Wait, value is not available - symbol is displayed when the channel is connected to the input which has not been yet configured. It is usually displayed in the beginning of the device operation.
---||---	Circuit break, concerns only the current inputs set to 4-20mA mode.
---E---	Value out of the range (exceeded) for the input.
---R---	Value out of the range for the sensor.
--ERR--	Measurement error due to reason other than those referred to above.

15 MODBUS RTU / MODBUS TCP TRANSMISSION PROTOCOL

15.1 General information

Process values and totalizers are available as *holding registers* and *input registers*. It is only possible to read the data.

15.1.1 Data types

uint/int 16bit	*Reg (Bit 15…0)*	
	HByte	LByte
	2.	1.

uint/int/float 32bit	*Reg_L (Bit 15…0)*		*Reg_H (Bit 31…16)*	
	HByte	LByte	HByte	LByte
	2.	1.	4.	3.

uint/int/float 32bit sw	*Reg_H (Bit 31…16)*		*Reg_L (Bit 15…0)*	
	HByte	LByte	HByte	LByte
	4.	3.	2.	1.

int/double 64bit	*Reg_L (Bit 15…0)*		*Reg_H (Bit 31…16)*		*Reg_L (Bit 47…32)*		*Reg_H (Bit 63…48)*	
	HByte	LByte	HByte	LByte	HByte	LByte	HByte	LByte
	2.	1.	4.	3.	6.	5.	8.	7.

15.2 Registers addresses

Process values are available in the floating-point format as per IEEE-754 for the 32-bit digit type with the floating point and single precision (32-bit floating point single).

The totalizers are available in the floating-point format as per IEEE-754 for the 64-bit digit type with the floating point and double precision (64-bit floating point double) or in int 64bit format.

Timers are available in uint 32bit format.

Addresses table of Process values

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300000 / 400000	00	2 (32bit float)
2	300002 / 400002	02	2 (32bit float)
3	300004 / 400004	04	2 (32bit float)
4	300006 / 400006	06	2 (32bit float)
5	300008 / 400008	08	2 (32bit float)
6	300010 / 400010	10	2 (32bit float)

Addresses table of Totalizer 1 (64bit double)

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300012 / 400012	12	4 (64bit double)
2	300016 / 400016	16	4 (64bit double)
3	300020 / 400020	20	4 (64bit double)
4	300024 / 400024	24	4 (64bit double)
5	300028 / 400028	28	4 (64bit double)
6	300032 / 400032	32	4 (64bit double)

Addresses table of Totalizer 2 (64bit double)

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300036 / 400036	36	4 (64bit double)
2	300040 / 400040	40	4 (64bit double)
3	300044 / 400044	44	4 (64bit double)
4	300048 / 400048	48	4 (64bit double)
5	300052 / 400052	52	4 (64bit double)
6	300056 / 400056	56	4 (64bit double)

Addresses table of Timer 1

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300060 / 400060	60	2 (uint 32bit)
2	300062 / 400062	62	2 (uint 32bit)
3	300064 / 400064	64	2 (uint 32bit)
4	300066 / 400066	66	2 (uint 32bit)
5	300068 / 400068	68	2 (uint 32bit)
6	300070 / 400070	70	2 (uint 32bit)

Addresses table of Timer 2

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300072 / 400072	72	2 (uint 32bit)
2	300074 / 400074	74	2 (uint 32bit)
3	300076 / 400076	76	2 (uint 32bit)
4	300078 / 400078	78	2 (uint 32bit)
5	300080 / 400080	80	2 (uint 32bit)
6	300082 / 400082	82	2 (uint 32bit)

Addresses table of Totalizer 1 (int 64bit)

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300084 / 400084	84	4 (int 64bit)
2	300088 / 400088	88	4 (int 64bit)
3	300092 / 400092	92	4 (int 64bit)
4	300096 / 400096	96	4 (int 64bit)
5	300100 / 400100	100	4 (int 64bit)
6	300104 / 400104	104	4 (int 64bit)

Addresses table of Totalizer 2 (int 64bit)

No. measuring channel	Register number	Modbus address	Size (in registers)
1	300108 / 400108	108	4 (int 64bit)
2	300112 / 400112	112	4 (int 64bit)
3	300116 / 400116	116	4 (int 64bit)
4	300120 / 400120	120	4 (int 64bit)
5	300124 / 400124	124	4 (int 64bit)
6	300128 / 400128	128	4 (int 64bit)